

SCIENCE

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FRIDAY, DECEMBER 5, 1902.

OGDEN N. ROOD.

CONTENTS:

Ogden N. Rood: PROFESSOR W. LE CONTE STEVENS	881
International Congress of Americanists at New York: PROFESSOR ALEXANDER F. CHAMBERLAIN	884
Fifth International Congress of Applied Chemistry: DR. H. W. WILEY.....	899
Scientific Books:—	
Recent Papers on Brachiopoda: PROFESSOR C. E. BEECHER. Gauss's Curved Surfaces: PROFESSOR A. S. HATHAWAY. van't Hoff's Vorträge über physikalische Chemie: PROFESSOR THEODORE W. RICHARDS.....	901
Societies and Academies:—	
The American Association for the Advancement of Science. N. Y. Academy of Sciences: Section of Geology and Mineralogy: DR. EDMUND O. HOVEY. Section of Astronomy, Physics and Chemistry: DR. S. A. MITCHELL. The Elisha Mitchell Scientific Society: PROFESSOR CHARLES BASKERVILLE.	904
Discussion and Correspondence:—	
The Kinetic Theory and the Expansion of a Compressed Gas into a Vacuum: PROFESSOR R. W. WOOD. Bitter Rot of Apples: PROFESSOR T. J. BURRILL. A Peculiar Hailstorm: DR. ALFRED W. G. WILSON. What is Nature Study? PROFESSOR W. J. BEAL, DR. A. S. PACKARD, PROFESSOR JOHN M. COULTER, PROFESSOR C. P. GILLETTE, PROFESSOR W. M. DAVIS, PROFESSOR A. E. VERRILL, PRESIDENT DAVID STARR JORDAN, PROFESSOR THOMAS H. MACBRIDE.....	908
Shorter Articles:—	
Teeth in Baptonodon: CHARLES W. GILMORE	913
Current Notes on Physiography:—	
Rivers of South Dakota; Argentine-Chilean Boundary; Maps of Faroe Islands: PROFESSOR W. M. DAVIS.....	914
The Magnetic Survey of Louisiana.....	915
The Rhodes Scholarships.....	916
Scientific Notes and News.....	917
University and Educational News.....	920

AFTER an illness of less than a week, Professor Rood died at his home in New York on Wednesday, November 12. At the time of his death he was the senior member of the faculties of Columbia University.

Ogden Nicholas Rood was born at Danbury, Connecticut, on February 3, 1831. His father was a Congregational minister, and his mother, Aleida Gouverneur Ogden, belonged to an old and aristocratic family of New York. When seventeen years of age he was sent to Princeton, where he was graduated in 1852. He had already exhibited marked aptitude for experimental science, and this fact decided his taking a course of post-graduate study at the newly organized Sheffield Scientific School in New Haven, where the two Sillimans, father and son, in conjunction with James D. Dana, had established a focus of American scientific activity. This course was crowned with the degree of master of arts, there being at that day little or no differentiation of scholastic degrees in this country.

In 1854 young Rood went to Europe, continuing his scientific studies at the universities of Munich and Berlin during four years, but without taking the doctor's degree. This was in nowise due to lack of fitness for it, but rather to his life-long

aversion for everything that savored of ostentation. Subsequently he refused repeatedly such honorary degrees as were offered him, yielding only during the last few years to the two institutions, Princeton and Yale, with which his early associations were strongest. In 1858 he returned to America with a German bride, and accepted an offer of the professorship of chemistry and physics in the Troy University, a denominational institution which had recently been organized in the immediate neighborhood of the better known Rensselaer Polytechnic Institute. Here Professor Rood remained five years. He resigned in 1863, and during the following year he accepted the chair of physics in Columbia College, which had just been made vacant by the withdrawal of Professor R. S. McCulloch. For thirty-eight years, including the best years of mature manhood, from thirty-three to nearly seventy-two, his name has been widely known in connection with this institution as one of its scientific staff. Of his early colleagues, Barnard, Joy, Egleston, Newberry, Peck and Chandler, three of whom organized the School of Mines, which is now the school of applied science in Columbia University, all but one have now passed away.

As a physicist Professor Rood gave but little attention to abstruse mathematical analysis. He was essentially an experimentalist, and one of great originality and skill. His period of greatest activity preceded the present day of extreme specialization. Much of his work belonged to the domain shared by the physicist, artist and psychologist. As a young man in Europe he had access to the best that was afforded in such art centers as Munich, Dresden and Berlin. He had a passionate love for art, and the study of the triumphs of Rubens and Titian in color was to him as engaging as the more exact work of Fraun-

hofer, Maxwell and Helmholtz. At his summer home in Stockbridge, Massachusetts, his vacations were devoted largely to recreation with brush and pencil, and many of his water-color sketches have elicited admiration at the annual exhibitions of the American Water Color Society in New York. He had a well-trained ear for music, and in physics his fondness for acoustics and optics was marked. As a lecturer his style was singularly clear, and his illustrations were well selected and happy. A popular lecture on 'Mysteries of the Voice and Ear,' delivered in 1873 before the Yale Scientific Club, was universally regarded as a model of its kind. Tyndall had just finished a series of lectures in America that aroused great public interest and created a demand that was well met by Morton, Mayer and Rood.

Soon after beginning his duties in Troy Professor Rood published in the *American Journal of Science* an article 'On Adapting the Microscope as a Goniometer and for Determining Index of Refraction.' This indicated the choice he had already made of experimental optics as a specialty. It was soon followed by papers on 'Circular Polarization by Cooled Glasses,' 'Contraction of the Muscles by Vibration,' 'On Probable Means of Rendering Visible the Circulation in the Eye,' and a criticism of 'A New Theory of Light' which had just been propounded by an Englishman, John Smith. His lifelong interest in physiological optics became well developed about this time, and he had an interested co-worker in his colleague, Professor Edwin Emerson. Among his papers on this subject was one 'On a Method of Producing Stereographs by Hand' (1861); others 'Upon Some Experiments Connected with Dove's Theory of Luster' (1861); 'On the Relation between our Perceptions of Distance and Color' (1861); and 'On some Stereoscopic Experiments' (1862).

Along with these laboratory studies in Troy Professor Rood conducted a series of out-door investigations which were published in 1860 under the title 'Experiments on the Forms of Elongated Projectiles.' He was fond of rifle practice, and in Troy at that time there was a rifle manufactory where probably the best weapons of this kind in America were made. He devised a special form of ballistic pendulum for measuring velocity, studied the relation between accuracy of flight and the rate of rotation of the projectile on its longitudinal axis, and investigated penetrative power as related to the form of the projectile, its initial velocity and the position of its center of gravity. Comparing his results with those attained in England and on the continent of Europe, he demonstrated the marked superiority of American rifled guns. The country was on the eve of civil war, and the investigation was of much more than theoretic interest.

While in Troy Professor Rood was active as an amateur photographer. In 1861 and 1862 he published papers 'On the Practical Application of Photography to the Microscope,' 'On the Investigation of Microscopic Forms by Means of the Images which they Furnish of External Objects,' and 'On the Study of the Electric Spark by the Aid of Photography.' About the same time he was the pioneer in the successful construction of fluid prisms of highly dispersive power for the study of the spectrum, attaining a degree of accurate definition far in advance of what had previously been accomplished with such prisms.

Professor Rood's demonstrated ability as an experimentalist and the reputation he had rapidly made by his researches were what determined his call to Columbia College in 1864 and his election to membership in the National Academy of Sciences

during the same year. In New York he developed a long-continued research on the use of the revolving disk as a means of measuring very small intervals of time, still continuing his studies on the spectrum, and specializing on the quantitative analysis of the phenomena of color mixture and color contrast. But this did not prevent temporary excursions into other fields. In 1874 he published an 'Optical Method of Studying the Vibrations of Solid Bodies,' and during the same year he made quite an elaborate research 'On the Application of the Horizontal Pendulum to the Measurement of Minute Changes in the Dimensions of Solid Bodies.' The exactitude of this measurement is indicated by the statement that the probable error of a single measurement was reduced to about one twenty-millionth of an English inch, or roughly one three-hundredth of a wave-length of violet light.

The use of the revolving disk was specially applied to observations of the duration and multiple character of flashes of lightning and of disruptive discharges between the electrodes of induction coils and influence machines. Other investigators had estimated the duration to be, in some cases, as little as one millionth of a second. It was shown by Rood that this was far too small. The actual range of variation is of course great, but his experiments indicated that, for a Leyden jar connected with an induction coil, an average value was about one five-hundredth of a second.

In 1880 and 1881 Professor Rood devoted much attention to the study of vacuum pumps, his aim being not to increase their commercial efficiency, but to ascertain the limit of perfection attainable, even though with such expense of time as to interfere with ready availability. He modified and so improved the Sprengel mercury pump as to secure a vacuum much more nearly perfect than had been secured

by any of his predecessors. The commercial importance of the mercury pump had but recently been greatly enhanced by the introduction of vacuum bulbs for incandescent electric lighting. In one of these a vacuum of one millionth is sufficient. Crookes had attained a vacuum of one seventeen-millionth. Rood's improvements added scarcely anything to the cost of the pump, but he attained a vacuum estimated to be very nearly one four-hundred-millionth.

The results of Professor Rood's extended researches on color were collected by him into a volume, entitled 'Modern Chromatics,' which was published in 1879. This book at once became a standard, and has continued to be so to the present time. The author's style is so easy and clear as to be readily intelligible to the non-professional reader, but without any sacrifice of scientific truth. He frankly adopts the theory of color-vision propounded by Young and extended by Helmholtz, accepting it as the best working theory, whatever may be the difficulties based on purely psychological grounds. During the twenty-three years that have elapsed since the publication of this book the number of theories of color-vision that have been brought forward is so great that only professional psychologists can be expected to know them. If any one of them should ever be established, its adoption will not detract from the value of the present volume. Since 1890 the author has published two noteworthy papers on physiological optics, one on 'A Color System,' and the other on 'A Photometric Method which is Independent of Color.' In his hands, and also those of others, the 'flicker' photometer invented by him has yielded results quite comparable in accuracy with what is attainable by the use of instruments intended exclusively for comparison of lights of the same hue.

One of the last researches published by Professor Rood was on 'Regular or Specular Reflection of the Röntgen Rays from Polished Metallic Surfaces.' The experiments seemed to indicate that a small percentage of these rays may be reflected from polished surfaces, and that they consist probably of transverse waves like those of ordinary light, but of shorter length.

Professor Rood was essentially a student, devoted to pure science, and not in sympathy with the commercial spirit which has so long tended to deter American students from choosing science for a career. This fact caused him to appear to many as a recluse. But he always had a welcome for those who could understand his point of view; and the present writer remembers with keen pleasure the kindly words and generous encouragement accorded by the distinguished physicist to a young stranger who, more than twenty years ago, formed his acquaintance on the basis of two articles, just published, on physiological optics. The friendship thus started was never broken.

W. LE CONTE STEVENS.

WASHINGTON AND LEE UNIVERSITY.

*INTERNATIONAL CONGRESS OF AMERICAN-
ISTS AT NEW YORK.*

IN accordance with the invitation of the American Museum of Natural History, extended through its President, Mr. Morris K. Jesup, and the Duc de Loubat, the Thirteenth Session of the Congrès International des Américanistes met in New York during the week from Monday to Saturday, October 20-25. The preparations for the meeting were under the auspices of the Committee on Organization, which consisted of Morris K. Jesup (President), the Duc de Loubat (Vice-President), M. H. Saville (General Secretary), Harlan I. Smith (Treasurer) and the following members representing learned and scientific institutions: Franz

Boas (Columbia University), E. G. Bourne (Yale University), C. P. Bowditch (American Antiquarian Society), J. C. Branner (Leland Stanford Junior University), J. V. Brower (Minnesota Historical Society), H. C. Bumpus (American Museum of Natural History), S. H. Carney, Jr. (New York Historical Society), A. F. Chamberlain (Clark University), T. F. Crane (Cornell University), Stewart Culin (University of Pennsylvania, American Philosophical Society, Numismatic and Antiquarian Society of Philadelphia), G. A. Dorsey (Field Columbian Museum), G. T. Emmons (U. S. Navy), Livingston Farrand (New York Academy of Sciences), J. Walter Fewkes (American Association for the Advancement of Science), G. P. Garrison (Texas State Historical Association), D. C. Gilman (Johns Hopkins University), C. S. Gledhill (Kansas State Historical Society), Stansbury Hagar (Brooklyn Institute of Arts and Sciences), H. W. Haynes (American Academy of Arts and Sciences, Massachusetts Historical Society), F. W. Hodge (Smithsonian Institution), Levi Holbrook (American Geographical Society), W. J. Holland (Carnegie Museum), W. H. Holmes (U. S. National Museum), A. L. Kroeber (University of California), O. T. Mason (Columbian University), W. J. McGee (National Geographic Society), C. B. Moore (Academy of Natural Sciences of Philadelphia), Edward S. Morse (National Academy of Sciences), W. W. Newell (American Folklore Society), A. S. Packard (Brown University), G. H. Perkins (University of Vermont), J. W. Powell (Bureau of American Ethnology), F. W. Putnam (Harvard University), W. B. Scott (Princeton University), Frederick Starr (University of Chicago), J. J. Stevenson (New York University), R. G. Thwaites (State Historical Society of Wisconsin), J. W. White (Archaeological Institute of America), James G.

Wilson (American Ethnological Society), Thomas Wilson (Anthropological Society of Washington), Talcott Williams (American Historical Association).

This committee had the misfortune to lose, before the assembling of the congress, two of its most able and respected members, Dr. Thomas Wilson and Major J. W. Powell, whose deaths were deeply felt by all their colleagues.

The labor of preparing for the meetings, arranging the program and other exercises fell upon the president, vice-president, secretary, treasurer and the authorities of the American Museum of Natural History (where all the regular meetings were held), who deserve the gratitude of the delegates for their untiring efforts to make the congress a great success. Before the actual commencement of the congress, the Duc de Loubat gave a dinner on Sunday for the delegates then in the city from foreign lands. Throughout the week lunch was served in the museum at one o'clock, and the hour between one and two P.M. was always enjoyed by the delegates in personal intercourse and private discussion.

For the most part, the general sessions of the congress took place from 10:30 A.M. to 1 P.M., and from 2 to 5 P.M.

DELEGATES.

The following governments were represented by delegates at the congress: Argentine Republic: M. C. Merou; Arizona: W. P. Blake; Costa Rica: Juan F. Ferraz and H. Pittier de Fabrega; Germany: Eduard Seler; Guatemala: Julio Yela; Honduras: N. B. Peraza; Italy: Giovanni Branchi; Mexico (Federal): Leopoldo Batres, Alfredo Chavero, Nicolas León; Mexico (State): A. Fernandez; Netherlands: J. L. van Panhuys; Oaxaca (State): Francisco Belmar; Paraguay: A. M. Criado; Uruguay: L. A. Herrera; U. S. Navy: G. T. Emmons.

The museums, etc., sending delegates were: American Museum of Natural History (New York): H. C. Bumpus; Carnegie Museum (Pittsburgh): W. J. Holland; Field Columbian Museum (Chicago): George A. Dorsey; Museo Nacional (La Plata): Juan B. Ambrosetti, Peabody Museum (Cambridge): Miss Alice C. Fletcher; Provincial Archeological Museum (Toronto): David Boyle; Royal Ethnographical Museum (Stockholm): Hjalmar Stolpe; Smithsonian Institution (Washington): F. W. Hodge; U. S. National Museum (Washington): W. H. Holmes.

These learned and scientific societies sent delegates: Academy of Natural Sciences (Philadelphia): Edward S. Morse; American Academy of Arts and Sciences: Henry W. Haynes; American Anthropological Association: J. D. McGuire; American Antiquarian Society (Worcester): Charles P. Bowditch; American Association for the Advancement of Science: J. Walter Fewkes; American Ethnological Society: James Grant Wilson; American Folk-lore Society: W. W. Newell; American Geographical Society: Levi Holbrook; American Historical Society: Talcott Williams; American Philosophical Society (Philadelphia): Stewart Culin; Anthropological Institute of Great Britain and Ireland (London): A. P. Maudslay; Anthropological Society of Washington: Walter Hough; Archeological Institute of America: J. W. Williams; Brooklyn Institute of Arts and Sciences: Stansbury Hagar; Carnegie Institution: D. C. Gilman; Colorado Cliff Dwellings Association: Mrs. Virginia McClurg; Davenport Academy of Natural Sciences: H. St. Clair Putnam; Instituto Fisico-Geografico de Costa Rica: H. Pittier de Fabrega; Kansas State Historical Society: Charles S. Gleed; Massachusetts Historical Society: H. W. Haynes; National Academy of Sciences: Edward S. Morse; National Geographic

Society: W. J. McGee; New York Academy of Sciences: Livingston Farrand; New York Historical Society: S. H. Carney, Jr.; Numismatic and Antiquarian Society (Philadelphia): Stewart Culin; Ohio State Archeological and Historical Society: W. C. Mills; Société d'Anthropologie de Paris: G. G. McCurdy; Svenska Sällskapet for Antropologi: C. V. Hartman; Texas Historical Association: G. P. Garrison.

The following universities, etc., were also represented by delegates: Brown University: A. S. Packard; Clark University: A. F. Chamberlain; Collège de France: Léon Lejéal; Cornell University: T. F. Crane; Columbia University: F. Boas; Columbian University: O. T. Mason; Harvard University: F. W. Putnam; Johns Hopkins University: D. C. Gilman; Leland Stanford Jr. University: J. C. Branner; Princeton University: W. B. Scott; New York University: J. J. Stevenson; University of Berlin: K. von den Steinen; University of California: Mrs. Z. Nuttall, A. L. Kroeber, Max Uhle; University of Chicago: Frederick Starr; University of Glasgow: J. H. Biles; University of Pennsylvania: Stewart Culin; University of Vermont: G. H. Perkins; Yale University: E. G. Bourne. From these lists it will be seen that the gathering, which included many other distinguished men and women not delegates, was quite a representative one, especially for the United States and Mexico. The Americanists of the Province of Quebec were sparsely represented. Many of the delegates had their wives and families with them, which added to the pleasure and interest of the occasion.

The object of the congress is to bring together 'Americanists,' *i. e.*, those men and women of science, and others, who devote themselves to the study of: (1) The native races of America—their origin, distribution, history, physical characteristics, languages, inventions, customs, and re-

ligions; (2) the history of the early contact between America and the Old World.

Communications may be either oral or written, and the French, German, Spanish, Italian and English languages may be employed in papers, discussions, etc. All papers presented to the congress will, with the approval of the committee, be printed in the volume of *Proceedings*.

In honor of the occasion *Globus*, the illustrated scientific weekly of Braunschweig, Germany, published a special double number consisting entirely of 'Yukatekische Forschungen' by Teobert Maler.

PAPERS.

The following is the list of authors with the papers presented to the congress:

AMBROSETTI, JUAN B.: 'The Archeology of the Calchaqui Region.'

BATRES, LEOPOLDO: 'The Excavations in the Escalerillas Street in the City of Mexico; Explorations at Monte Albán.'

BELMAR, FRANCISCO: 'Estudio sobre la raza Ayook ó Mixe, y la lengua hablada por ella; Indian Tribes of the State of Oaxaca and their Languages.'

BLAKE, W. P.: 'The Racial Unity of the Historic and Prehistoric Aboriginal People of Arizona and New Mexico.'

BOAS, FRANZ: 'The Work of the Jesup North Pacific Expedition; Conventionalism in American Art.'

BOGORAS, WALDEMAR: 'The Folk-lore of N. E. Siberia as Compared with that of N. W. America.'

BRETON, MISS ADÈLE: 'The Ancient Obsidian Mines of Mexico.'

BROWER, J. V.: 'Rediscovery of Quivira and Harahey; Dakota Indians as Builders of Earthworks; Identification of Kakabikansing Quartz Blades.'

CASTELLANOS, A.: 'The Ruins of Monte Albán.'

CHAMBERLAIN, ALEXANDER F.: 'The Algonquian Linguistic Stock.'

CHAMBERLIN, T. C.: 'The Lansing Man.'

CHAVERO, ALFREDO: 'Los signos de los días en el calendario de Palenque.'

CULIN, STEWART: 'The Ethnic Significance of Games in Reference to New and Old World Cultures.'

DELLENBAUGH, F. S.: 'The Location of Cibola and the Historic Towns of the Rio Grande Valley in New Mexico prior to 1630.'

DIXON, ROLAND B., and KROEBER, A. L.: 'The Languages of California.'

DORSEY, GEORGE A.: 'The Lansing Skull; Wichita Creation Myth; Pawnee Star Cult.'

DOUAY, LÉON: 'Contribution à l'étude du mot Titecaca; De la non parenté de certaines langues de l'ancien monde (en particulier du Japonais) avec celles du nouveau et spécialement avec le groupe Maya.'

DU BOIS, MISS C. G.: 'Early Art of the Mission Indians of Southern California.'

FARWELL, ARTHUR: 'American Indian Music (Ethnic and Artistic Significance), with Illustrations upon the Pianoforte.'

FERNANDEZ, ALONZO: 'Mankind in America.'

FERRAZ, JUAN F.: 'Sintésis ó construcción gramatical de la lengua Quiché.'

FEWKES, J. WALTER: 'The Hopi Earth Mother.'

FLETCHER, MISS ALICE C.: 'A Pawnee Star Cult.'

GARCIA, GENARO: 'Vida y hechos de Pedro Menendez de Avilés, Adelantado de la Florida. Relación escrita en el siglo XVI. por el maestro Bartolomé Barrientos. La publica por la vez Genaro Garcia, en homenaje al XIII. Congreso de Americanistas. México, 1902.'

GRASSERIE (DE LA), RAOUL: 'Contributions à l'étude de la langue Tehuelche ou Tsoneka de la Patagonie.'

GRINNELL, GEORGE B.: 'The Social Organization of the Cheyennes.'

HAGAR, STANBURY: 'Cuzco, the Celestial City.'

HARTMAN, C. V.: 'Archeological Researches in Costa Rica; The Aztecs of Salvador.'

HEWITT, J. F.: 'The History of the Sun God in India, Persia and Mexico, his Annual Death and Resurrection, and his Impenetrable Armor.'

HODGE, F. W.: 'The Influence of Four Centuries on the Pueblo Indians.'

HOLLAND, W. J.: 'The Petroglyphs at Smith's Ferry, Pa.'

HOLMES, W. H.: 'The Lansing Man; The Relation of the Glacial Period to the Peopling of America.'

HRDLÍČKA, A.: 'Physical Anthropology of the Indians of the Southwestern United States and Northern Mexico (Hyde Expedition); Somatological Notes on the Bones of the Lansing Man.'

KROEBER, A. L.: 'The Indians of Northwestern California' (see also Dixon, R. B.).

LECOCQ, MARIA: 'Notes relatives au Phénicienisme des langues Américaines.'

LEHMANN, WALTER: 'Tamoanchan and other Designations of the West, and their Relations to the Earth in Mexican Etymology.'

LEJÉAL, LÉON: 'La collection céramique de M. de Sartiges et les vases péruviens à forme d'aryaballe du Musée National du Trocadéro.'

LEÓN, NICOLAS: 'Datos referentes a una especie nueva de escritura geroglífica en México.'

LOURAT, M. LE DUC DE: 'Mexican Manuscripts.'

LUMHOLTZ, CARL: 'Conventionalism in Designs of the Huichols of Mexico.'

MATTHEWS, WASHINGTON: 'Probable Myths of Parturition.'

MCCLURG, Mrs. VIRGINIA: 'The People of the Pueblos.'

McGEE, W. J.: 'Current Work of the Bureau of American Ethnology; Some Fundamental Factors in Social Organization.'

McGUIRE, J. D.: 'Anthropology in Early American Writings.'

MONTES, EMILIO M.: 'Reforma del alfabeto Español.'

MOORE, CLARENCE B.: 'Archeological Research in the Southern United States.'

MORSE, EDWARD S.: 'No Evidences of Chinese Contact in Central America.'

NUTTALL, Mrs. ZELIA: 'A Penitential Rite of the Ancient Mexicans; A Suggestion to Maya Scholars; The Ancient Mexican Name of a Constellation According to two Different Authors.'

OSBORN, HENRY F.: 'On Possible Evidence of Early Pleistocene Man in America.'

PANHUYS, J. L. VAN: 'A Communication from the Curaçao Society for the History, Language and Ethnology of the Dutch West Indies, about the Grave of Columbus; On the Origin and Meaning of the Name *Catskill*; Are there Pygmies in French Guiana? On the Ornamentation in use by Savage Tribes in Dutch Guiana, and its Meaning; Carib Words in the Dutch Language, and in use in Dutch Guiana; A Claim for the Dutch having Discovered the Coast of Guiana; Ways of Paying in the New Netherlands, Dutch Guiana, and the former Dutch Colonies of British Guiana; A Brief General Survey of the Early Contact of the Dutch with the New World.'

PEET, S. D.: 'The various Symbols common in the East which are found in America.'

PEÑAFIEL, ANTONIO: 'El templo mayor de Mexico antiguo y los monumentos encontrados en las excavaciones de 1897 y 1902.'

PEPPER, GEORGE H.: 'Notes on the Art of the Pueblo Bonito, New Mexico; The Throwing-Stick.'

PITTIER DE FABREGA, H.: 'The Language of the Terrabá Indians of Costa Rica.'

PUTNAM, F. W.: 'On the Archeology of the Delaware Valley' (exhibition of specimens).

RINK, MADAME SIGNE: 'A Comparative Study of Two Indian and Eskimo Legends.'

ROSA (DE LA), GONZALEZ: 'How I Discovered that the so-called Toscanelli Correspondence was a Forgery, and that Science had Nothing to do with the Discovery of America; Notes on the peculiar Language of the Chimu of the Peruvian Coast, and on some Traces of the use of Hieroglyphic Writing by this Civilized People.'

SAVILLE, M. H.: 'The Cruciform Structures at Mitla.'

SELER, EDUARD: 'The Pictorial and Hieroglyphic Writing of Mexico and Central America; Antiquities of the Pacific Slope of Guatemala; Ancient Mexican Religious Poetry.'

SHIPLEY, JOHN B.: 'Notes on the Second Letter of Toscanelli.'

SMITH, CHARLES H.: 'The Early Civilization of America.'

SMITH, HARLAN I.: 'Shell-heaps of the Lower Fraser River, British Columbia.'

STARR, FREDERICK: 'The Physical Features of South Mexican Indians.'

STOLPE, HJALMAR: 'Swedish Ethnological Work in South America and in Greenland.'

SWANTON, JOHN R.: 'Social Organization of the Haidas.'

THOMPSON, EDWARD H.: 'Mural Paintings of Yucatan; Phonographic Reproductions of Maya Songs and Conversation.'

TOZZER, ALFRED M.: 'A Navajo Sand Picture of the Rain Gods and the Attendant Ceremony.'

UHLE, MAX: 'Archeological Researches in Peru; On the Linguistic Features of Ancient Peru.'

VIGNAUD, HENRY: 'On the Toscanelli Letters.'

WARDLE, H. NEWELL: 'Certain Clay Figures of Teotihuacan.'

WILLISTON, S. W.: 'On the Lansing Man; On the Occurrence of an Arrowhead with Bones of an Extinct Bison.'

WISSLER, CLARK: 'Symbolism of the Dakotas.'

As may be seen from the above list, the subjects of the papers and discussions were of the most varied and diverse character. While the rules of the congress limited the actual time of each paper to twenty minutes, few of those who participated exceeded their allotment. In extent, the communications ranged from mere notes (like some of those of Mr. van Panhuys) to

résumés of monographs and books, embodying the results of original research, such as Batres's 'Explorations of Monte Albán,' Belmar's 'Estudio sobre la raza Ayook ó Mixe,' Chavero's 'Los signos de los días,' Ferraz's 'Sintésis de la lengua Quiché,' Garcia's 'Vida y hechos de Pedro Menendez de Avilés,' Hartman's 'Archeological Researches,' etc., all of which, after a fashion obtaining in Europe and in the Spanish American countries, were presented in printed form, as a compliment to the members of the congress, something one or two of the newspaper reporters seem not at all to have understood. A considerable number of the papers on the program were, in the absence of their authors, read by title or in brief abstract: Brower, Castellanos, Douay, Fernandez, Ferraz, de la Grasserie, Hewitt, Hrdlička, Lecocq, Lehmann, Lumholtz, Matthews, Moore, Montes, Peet, Peñafiel, Pittier de Fabrega, Rink, Shipley, Vignaud. The close of the session on Saturday evening left some very important papers, such as those of Professor Max Uhle on Peruvian archeology, unread. This is a matter of regret, as interesting facts were to be presented, and important discussions would doubtless have arisen. The quality and scientific value of the papers presented to the congress were in advance of those of some of the previous meetings, a much larger proportion of solid contributions to human knowledge being in evidence, and a smaller number of wildly theoretical and pseudo-scientific essays. The appearance of titles relating to the 'Phenicianism' of Amerindian tongues and Mr. J. F. Hewitt's mythological theories, however, leaves room for improvement. Mr. Juan de Ferraz's paper on the Quiché language was *sui generis*. In it the author maintains, with ingenious manipulation of phonetics, that 'Quiché is an artificial tongue, scientifically constructed, by a

marvelous method, on roots taken principally from the Huastec, Aztec and Maya languages; and in short we might proclaim it an American Volapük.' The authors of this 'American Volapük' were the 'learned men' of the race, and Mr. Ferraz thinks he has in this wonderful language discovered the master-key to Mayan hieroglyphics, etc. His book on the subject, of which this paper is a résumé, will be published shortly. This was decidedly the most imaginative contribution presented to the congress.

MONDAY, OCTOBER 20.

At 10 A.M. there was a meeting, in the library of the museum, of the General Committee of Organization; and at noon the first general session for the election of permanent officers of the congress took place. These were designated as follows:

President, Morris K. Jesup (President American Museum of Natural History).

Honorary President, the Duc de Loubat (Correspondent of the Institut de France).

Vice-Presidents, Juan B. Ambrosetti (Argentine Republic); Alfredo Chavero (Mexico); Léon Lejéal (France); Karl von den Steinen (Germany); Hjalmar Stolpe (Sweden); F. W. Putnam (United States).

General Secretary, M. H. Saville (American Museum of Natural History).

Treasurer, Harlan I. Smith (American Museum of Natural History).

These officers, together with the delegates from the various governments, institutions of learning, scientific and historical societies, etc., specified above, formed the bureau and council of the congress.

The morning session was presided over by Mr. Jesup, who briefly welcomed the delegates, and expressed his opinion that to foster science was a noble ambition in which American business men, who had made a success of life, might well emulate one another. The delegates showed by their applause that they appreciated the modest remarks of the president of the

museum, who has done so much for anthropology in particular.

At the afternoon session, the chair was taken by the Duc de Loubat, who spoke briefly upon 'Mexican Manuscripts,' taking exception to the common opinion that the monks who followed close in the wake of the first Spanish invaders were responsible for the destruction of so many precious manuscripts. For the few that have been preserved, we are indebted largely to the monks and to the Catholic institutions where they found shelter. The Duke also argued for an American edition of Sahagun's work, the 'pre-Columbian Bible.' He then resigned the chair to Professor F. W. Putnam, who, after paying graceful tributes to the late Thomas Wilson and Major J. W. Powell, members of the council of the congress, who have recently passed away, gave an account of the American Museum of Natural History and the work accomplished under its auspices during the past ten years. That the museum was able to carry on these extensive and fruitful investigations has been due to the broad-minded generosity of Henry Villard, Mrs. Villard, Mr. and Mrs. C. P. Huntington, Mr. and Mrs. Jesup, the Duc de Loubat, Dr. F. E. Hyde and his sons Frederick and Talbot Hyde. The Duc de Loubat and Dr. Hyde had also provided the funds for the investigations in the Trenton Gravel. The American Museum was designed to occupy five times the space it does at present. Professor Putnam also reported on the excellent work of the Peabody Museum (Cambridge), which has done so much to advance our knowledge of the hieroglyphics and other monuments of Central America.

Brief reports of a similar nature were made by Dr. W. J. McGee for the Bureau of American Ethnology (Washington), Dr. W. J. Holland for the Carnegie Museum (Pittsburgh), Professor Stewart

Culin for the Museum of Science and Art (Philadelphia), Professor Edward S. Morse for the Museum at Salem, Professor Frederick Starr for the Davenport Academy of Natural Sciences, and Dr. George A. Dorsey for the Field Columbian Museum (Chicago).

Dr. McGee made special reference to the work of Dr. Gatschet (who edited the Trumbull dictionary to Eliot's Bible, now in press), Mr. Hewitt (Iroquoian lexicography and primitive philosophy), Miss Alice Fletcher (Pawnee ceremonies), Mr. James Mooney (ethnology of the Kiowa and other Plains Indians, particularly their 'heraldry'), Dr. J. Walter Fewkes (among the Pueblos, and more recently, in Porto Rico), and of Dr. Franz Boas, now consulting philological expert for the bureau. Several reports and a number of bulletins, rich in new scientific materials, are now in press. Dr. McGee spoke in eloquent terms of the loss the bureau and anthropology in America had sustained in the death of Major Powell.

Dr. Holland detailed some of the local archeological activities of the Carnegie Museum in the Monongahela and Allegheny valleys, in connection with a proposed map of this section of western Pennsylvania. Professor Culin, in the course of his remarks, expressed the opinion that the evidence now at hand compelled belief in long-continued and ancient intercommunication between America and Asia, with the probabilities in favor of influence from America to Asia and the Pacific islands. Professor Morse announced that the museum in Salem, originally founded by sea-captains, now contained the largest Japanese collection in the world. Dr. Dorsey, after sketching the origin of the Field Columbian Museum through the stimulus of the Anthropological Department of the World's Fair (under Professor Putnam) and the generosity of Mr. Mar-

shall, and indicating the work accomplished among the Pueblos and the western Indians, stated that, at the present time, anthropology occupied about half the museum. Professor Starr recounted the share of the Davenport Academy in the archeological investigations of the West and indicated some of the results accomplished.

The first formal paper read, that of Dr. Holland, on 'The Petroglyphs of Smiths Ferry' (rock-carvings of no extraordinary character), elicited a discussion on the meaning of such 'writings,' in which Mr. Metz, Dr. Max Uhle, Dr. Franz Boas, J. L. van Panhuys, R. Kronau, Dr. Ambrosetti and Professor Putnam took part. For Dr. Holland these pictographs were the product of the lazy pastime of fishers and hunters. Mr. van Panhuys saw more than this in those of Guiana; Dr. Uhle and Dr. Boas stated that pictographs varied in age a great deal; Mr. Kronau compared them to 'visiting cards' and the scribbling and drawing on walls, etc., among ourselves to-day; Dr. Ambrosetti noted resemblances between the pictographs of the Argentine and those of the Pueblo country of the United States; Professor Putnam mentioned the interesting fact that the Guadalupe petroglyph described at the first Congress of Americanists had recently been placed in the American Museum of Natural History.

The next paper read was by Dr. Alexander F. Chamberlain on 'The Algonquian Linguistic Stock.' The author pointed out the wide extension of this Amerindian family and its influence upon other stocks. Also the part played by Algonquians (Pocahontas, Powhatan, King Philip, Pontiac, Tecumseh, Black Hawk) in the contact with the whites, and the contributions of the Algonquian dialects to the spoken and written English of America—over 130 words (including chipmunk, hickory, hominy, mugwump, powwow, rac-

coon, skunk, squash, Tammany, terrapin, toboggan, totem, woodehuck, etc.) belong here. The dialectal divergence of Blackfoot, Arapaho, Cheyenne and Miemac, and the widespread Naniboju myth offer tempting fields for research. Dr. Chamberlain hoped to see the day when the Algonquian tongues would be studied as thoroughly as Greek and Latin have been. This paper was discussed by Dr. Boas, who pointed out that some twenty other linguistic stocks were also in dire need of being studied, and by Dr. McGee, who emphasized the importance of the questions involved in the rapid changes the aborigines were undergoing, not only in speech, but in customs and institutions. From 5:30 to 6 P.M. the delegates attended a reception tendered them in the museum by Professor H. C. Bumpus and Mrs. Bumpus. In the evening they were invited to the meeting of the Geological Section of the New York Academy of Sciences.

TUESDAY, OCTOBER 21.

The entire morning was devoted to the demonstrations of the collections of the various sections of the museum by the officials in charge, and was pleasantly and profitably spent. Many interesting private discussions arose and interchanges of opinion were made. The Lansing specimens came in for a full share of inspection, as did also those from the Trenton Gravel, which Professor Putnam ably interpreted to his colleagues.

The afternoon session began with Dr. Ambrosetti in the chair, who, after briefly sketching the anthropological work done recently in the Argentine Republic, read an interesting and valuable paper (in French) on 'The Archeology of the Calchaqui Region.' The stone monuments and other relics, mummies, graves and mounds, funeral urns, disks and plates of bronze and other materials, weapons, ornaments, pot-

tery (ornamentation and symbolism), etc., were discussed. Dr. Ambrosetti called attention to the similarity of the Calchaqui environment of the Argentine and that of the Pueblo Indians of Arizona and New Mexico; also likenesses in art, art products, symbolism, etc., between the anthropological phenomena of these two regions. This is an important question, well deserving thorough study. In the discussion on this paper, Dr. Uhle said that these resemblances were probably mere coincidences and no proof of ethnic kinship. A private view of Dr. Ambrosetti's large collection of photographs, etc., showed that the 'coincidences' were very numerous indeed, and some of them remarkable both in general nature and in particular detail.

The next paper was that of Mr. J. D. McGuire, on 'Anthropology in Early American Writings,' in which the author noted that much valuable material was to be found in the old accounts of the early settlers, priests, local historians, chroniclers, etc., of the first periods of European colonization and settlement, and outlined the nature of the data concerning the Amerinds to be found in such documents. Mr. McGuire's use of the new word *Amerind*, a term which Dr. Chamberlain had employed in his paper the day before (the word was coined under the auspices of the anthropologists of Washington) without exciting remark, precipitated a lively discussion. Dr. Boas denounced the word as a 'monster'; Professor Morse said it 'disgusted' him; Professor Putnam hoped the word would never survive, for one reason, outside of its origin and form—viz., that it implied (what had not yet been proved) the absolute racial unity of the American aborigines; Dr. Holland fought the word with a good deal of the *odium philologicum*; and Professor Starr, who had a special abomination for it, surprised even his 'anti-Amerindian' colleagues by declaring that

such words ought to be formed from Greek and Latin roots. The use of the word was defended by Mr. McGuire, Mr. Dellenbaugh and Dr. Chamberlain, who pointed out that the word *sociology* was denounced at its birth in just the same way, but has well survived. Anthropology, it was said, was greater than the schoolmen, and *Amerind* would live if it deserved to; that was the only question at issue. Abuse would only help the word along, if nothing better could be devised.

Dr. Stolpe then gave a brief account of Mr. C. V. Hartman's archeological researches in Central America, emphasizing the results accomplished, after which the congress voted its appreciation.

Professor Putnam resuméed Mr. Clarence B. Moore's 'Archeological Research in the Southern United States.' In the discussion Dr. McGee characterized this as a very fine piece of amateur work. The ninth section of Mr. Moore's publications has appeared in the *Journal of the Academy of Natural Sciences of Philadelphia*.

Mr. F. S. Dellenbaugh read his paper on 'The Location of Cibola, etc.,' which was discussed by Mr. F. W. Hodge, who said that exact conclusions as to distances traveled over could not be drawn from some of the statements of the early Spanish explorers, who varied in their estimates. The topographical argument, too, was against Mr. Dellenbaugh.

The next paper (in French) was by M. Gonzalez de la Rosa, on 'The Toscanelli Correspondence a Forgery,' in which the author detailed his discovery of the facts claimed. The papers on the Toscanelli question by Shipley and Vignaud were read by title. Professor Bourne, who was expected to lead the discussion on these papers, was unavoidably absent.

Tuesday evening was free for social intercourse and such amusements as the delegates cared to indulge in.

WEDNESDAY, OCTOBER 22.

By the morning session of Wednesday, the attendance at the meetings had become so large that they were held in the lecture hall on the first floor of the museum, where facilities for lantern-illustration, etc., were provided. The meeting began with M. Léon Lejéal presiding, who, after giving some idea of the work done in France, read (in French) his paper on 'The Sartiges Ceramic Collection in the Trocadero Museum.'

Dr. Franz Boas gave an account of 'The Work of the Jesup North Pacific Expedition,' and laid before the congress the numerous and extensive memoirs already published by the museum and containing the results of some of the investigations. The scope of these fruitful explorations covered both littorals of the Pacific from the Columbia to the Amur, including also a considerable portion of the interior of northwestern America and northeastern Asia. The work of Bogoras, Laufer, Dixon and Jochelson in Siberia, of Swanton, Smith, Farrand, etc., among the Indians of British Columbia and Alaska, and of Kroeber, Dixon, etc., among those of California, was briefly referred to. A vast amount of osteological, ethnological, linguistic and folk-lore material has been collected, which will undoubtedly throw much light upon the prehistoric and early historic relations of the native races of both sides of the Pacific. Indeed, much seems to be already proved.

The next paper was by Miss Du Bois, on 'Early Art of the Mission Indians of Southern California,' in which an appeal was made for the rescue of what remains of the 'aboriginal' about these people, who once loomed so large in the primitive history of California.

The paper of Mr. Bogoras, on the 'Folklore of Northeastern Siberia,' was one of the most valuable and most interesting of

the session. The author, who read in English, pointed out the many similarities and identities of general outline and minor detail between the legends and myths of northeastern Siberia and northwestern America, which indicated beyond a doubt long-continued inter-communication and exchange of ideas between the two continents, and probably also race-relations of the chief peoples within these areas. Mr. Bogoras's paper will appear in full in an early number of the *American Anthropologist*. In the discussion Dr. Chamberlain and Dr. McGee took part. The former expressed the opinion that contributions of such solid value as those resulting from the Jesup Expedition should be honored by vote of the congress. On motion of Dr. McGee (who was empowered to word the vote as befitted the occasion) the congress resolved that the work of the Jesup North Pacific Expedition was fully appreciated by the members, who desired to congratulate Mr. Jesup upon the important results achieved through his generous aid to anthropological science.

In his brief paper on 'Some Fundamental Factors in Social Organization' Dr. McGee illustrated, from his knowledge of the Seri, one of the most primitive groups of Amerinds (the speaker used the word without exciting the protests of his colleagues) in existence, the development of law, the tool and implement sense, etc. The presence (in its sheath at his side) of a knife obtained from the whites, of which the Seri had so little acquired the 'sense' as to go on tearing meat for food with his hands, was cited to show how slow in growth and how hard to acquire are some of the things we now perform automatically. The Seri represent a certain stage of culture in which the race may have been millenniums ago.

Miss Alice C. Fletcher read a paper giving the details of a 'Star Cult' of the

Pawnee Indians, and Dr. Dorsey, in lieu of reading his paper on a 'Wichita Creation Myth' (which is to appear in an early number of the *Journal of American Folklore*), added to the data obtained by Miss Fletcher, from his own observations among the same people. Miss Fletcher's excellent paper will shortly be published in full in one of the anthropological journals. The need for the speedy investigation of such tribes as the Pawnees was emphasized by Dr. Dorsey, who stated that one of Miss Fletcher's chief informants had died since she had obtained the data in question. In reply to an inquiry from Mr. Kronau, Miss Fletcher expressed the opinion that the religious ideas of the Pawnees had not been deeply influenced by the whites, and that their high ideas of the controlling forces of the world were not derived from missionary teachings.

The afternoon session was presided over by Señor Chavero, who, after resuming the work done in Mexico, presented his paper (in Spanish) on the 'Palenque Calendar,' in which he discussed the various interpretations of the day-signs from Pio Perez to Gunckel and other recent writers and investigators. The author concludes that 'the day-signs of the Palenque calendar are the same as those of the Maya calendar.' Señor Chavero's paper in printed form was laid before the congress.

A considerable portion of the day was taken up by the papers on the long-expected 'Lansing Man,' who proved, after all, not to be the *enfant terrible* he might have been. The now famous skull was on exhibition and was examined with great interest by many of the delegates. Professor T. C. Chamberlin, of the University of Chicago, who was among those announced to speak on the subject, could not be present. Professor Putnam, after a few introductory remarks, resuméed the paper of Professor Williston, which detailed the

geological and other conditions under which the bones in question were discovered, and that of Dr. Hrdlička, giving an account of his recent examination of the skull and other osseous remains. Dr. Dorsey also stated his opinion, as a craniologist, of the skull of the Lansing man, agreeing with Dr. Hrdlička in considering it of 'the ordinary type of the Indians of the region in which it was found.' No evidence of a 'plant' is forthcoming in this case, and also no question of a skull of a peculiar ancient type; so, if the geologists can settle the time of the deposit, we have, as Professor Putnam, in closing the discussion, said, clear evidence of the presence of the American Indian in that region at that epoch.

Professor Putnam spoke on the 'Archeology of the Delaware Valley,' illustrating his exposition of the progress made in the investigation of the famous Trenton Gravel with charts and specimens. The ensuing discussion was participated in by Dr. McGee, Professor Holmes and Dr. McCurdy. On the whole, the current of opinion expressed was rather more favorable to the contentions of Professor Putnam than in years past, and he had every right to be well pleased thereby.

The evening again was free, and many of the members availed themselves of the courtesies extended to them by the University, Author's, Century and other clubs, and those offered by private individuals.

THURSDAY, OCTOBER 23.

After the usual demonstration of collections in the museum, the members went in a body to Columbia University in acceptance of a cordial invitation from President Butler, who with Professors Hirth, Perry, Farrand, Peck, Cattell and Moore, received them in the Trustees' room at 11:30. After making a tour of the buildings of the university, under the expert guidance

of the professors and attendants, the party met in the dining-hall, where an excellent and very enjoyable lunch was served on behalf of the university. A brief and graceful speech of welcome was made by President Butler, and, on motion of Dr. Holland, a hearty vote of thanks was tendered Columbia University for its hospitality and other courtesies.

It was some time past the usual hour of meeting when the congress began the afternoon session, with Dr. Karl von den Steinen in the chair, who, in his introductory remarks, paid a glowing tribute to the great German anthropologist recently deceased, declaring that not since Humboldt had there been so firm a friend of the internationality of science as Rudolf Virchow.

The first paper of the afternoon was that of Mr. Farwell, on 'The Ethnic and Artistic Significance of American Indian Music.' After a brief statement of his theories, the author rendered on the piano an Omaha melody, 'The Old Man's Love Song'—first in its native simplicity, then 'harmonized,' and then elaborated, after the manner of the composer, with as much fidelity to legend and Indian surroundings as possible. A 'War Dance' melody was treated in like fashion. This subject was previously treated by Mr. Farwell in his 'Indian Melodies Harmonized,' published in 1901. In the discussion Dr. Boas touched upon some of the scientific questions involved, and noted the need for more and better understood data before the construction of theories.

Professor Starr's paper, on 'The Physical Features of South Mexican Indians,' was devoted to an account of the author's investigations of the physical characteristics (physiognomic in particular) of many different tribes. Life-size representations (from photographs) of the heads of type specimens of each tribe were hung up in the hall and referred to by the author

in illustration of his statements. Professor Starr also indicated the disposition of the very limited number of busts of Mexican Indians which he had caused to be made. After the paper Señor León complimented the author in Spanish.

Mr. van Panhuys then made some brief remarks on the evidence as to 'Pygmies in French Guiana.' The proof, as Dr. von den Steinen took occasion to remark, was far from convincing.

The next paper, by Mr. George B. Grinnell, treated briefly of 'The Social Organization of the Cheyenne Indians,' a people who 225 years ago lived on the flanks of the Rocky Mountains, outliers of the Algonquian stock. The clans are exogamous with maternal descent, and comparative equality of the sexes.

Mr. Alfred M. Tozzer's paper, on 'A Navajo Sand Picture,' was valuable as showing the practical conservatism of these delineations and ceremonials, certain features observed by the author being identical with those noted by Dr. Washington Matthews twenty years previously.

The paper by Dr. Kroeber, on 'The Indians of Northwestern California,' and that by Dr. Dixon and Dr. Kroeber, on 'The Languages of California,' illustrated by maps of distribution, were interesting studies in comparative philology and culture history. The various subgroups of languages were indicated and their phonetic, structural and lexical peculiarities noted. The opinion was expressed that the diversities of culture followed in general in this region the same lines as those of language.

The last paper (lecture, rather) of the day was by Mrs. McClurg, regent of the Women's Cliff Dwellings Association of Colorado City, on 'The People of the Pueblos,' and was of a very general nature.

In the evening Mr. Jesup gave a dinner for the foreign delegates.

FRIDAY, OCTOBER 24.

This was Mexican day at the congress. The morning session opened with Dr. Stolpe in the chair.

Dr. Seler, in his paper on 'The Pictorial and Hieroglyphic Writing of Mexico and Central America,' gave a general résumé of the present state of our knowledge of the subject. He laid stress upon the Maya hieroglyphs as of great interest and importance.

Señor Batres gave an account of his 'Explorations at Monte Albán' (the printed report of which was laid before the congress). The character of the finds seems to indicate that Monte Albán, near the city of Oaxaca, was a point of Zapotecan-Mayan contact. He also reported on 'The Excavations in the Escalerillas Street in the City of Mexico,' which have resulted in the discovery of remains of the old Aztec city long buried beneath the débris of the later Spanish one.

The next paper was read by Professor Seler, on 'Ancient Mexican Religious Poetry.' Mrs. Nuttall, in her 'A Suggestion to Maya Scholars,' said that the classifying suffixes of numerals might be found expressed in the hieroglyphic writings. In her paper on 'A Penitential Rite of the Ancient Mexicans,' which was illustrated with the stereopticon, Mrs. Nuttall treated of the religious rite of piercing the ears and tongue to obtain a sacrifice of blood.

Dr. Nicolas León reported on 'A New Kind of Hieroglyphic Writing in Mexico,' and Miss Adèle Breton exhibited some excellent reproductions of Mexican fresco paintings.

Señor Belmar reported on the 'Indians of Oaxaca,' and laid before the congress his 'Estudio del Idioma Ayook (Mixe),' a volume of some 260 pages, constituting a valuable contribution to our knowledge of the Mixe language and people.

Mr. Thompson's paper, 'Phonographic Reproduction of Maya Songs and Conversations,' consisted of screen-pictures of a kinetoscopic representation of the 'sundance' of the Mayas, with phonographic accompaniment reproducing the songs and music belonging to the ceremony.

At the afternoon session Dr. Maudslay occupied the chair.

In the evening Dr. Boas gave a smoker for the men delegates.

SATURDAY, OCTOBER 25.

The morning session began with Mr. van Panhuys in the chair.

In the first paper read by him, Mr. van Panhuys expressed the opinion that the New York name Catskill was given by the Dutch in honor of Kaatz, a statesman and writer of the early part of the seventeenth century. In a second paper he treated of the Dutch claim to have discovered the coast of Guiana, and the legend of 'Stuyvesant's cemetery' at Curaçao.

In his paper on 'The Racial Unity of the Historic and Prehistoric Aboriginal People of Arizona and New Mexico,' Mr. Blake called attention to the destruction of ancient monuments now going on in the Pueblo country. The mention of the fact that the people of this region, past and present, were very fond of 'green stones' led Professor Putnam to remark that green seemed to be a very popular color all over the globe. Mr. Thompson observed that the sacred tree of the Mayas was literally the 'green tree.'

M. Gonzalez de la Rosa's paper, on 'The Chimu Language,' was discussed by Dr. Uhle, who stated that this tongue was now spoken only by the village, the inhabitants of which are engaged in the straw hat industry.

The next paper was by Mr. van Panhuys, on 'Carib Words in Dutch'; some of which,

Dr. von den Steinen pointed out, were not Carib at all in the proper sense.

In the afternoon session, over which Mr. Jesup presided, Mr. van Panhuys exhibited and discussed certain art-objects (carved combs, gourds, etc.) which indicated the influence of the 'Bush Negroes' of the interior of Dutch Guiana upon the culture of the aborigines of the Red race. The human and snake figures referred to by the author were discussed by Dr. Stolpe, who remarked that the first thing the human figure loses in ornament is the head.

Mr. C. V. Hartman illustrated his 'Archeological Investigations in Costa Rica' with lantern-slides, and Mr. Pepper, in connection with his paper, 'Notes on the Arts of the Pueblo Bonito' (Hyde Exploring Expedition), exhibited a number of stereopticon views. Pottery in particular was discussed and illustrated, also basketry.

During the afternoon session the congress voted to hold its next meeting at Stuttgart, in response to an invitation delivered by Dr. von den Steinen. The following committee to prepare for the congress of 1904 was selected: Count Linden (Chief Chamberlain to the King of Württemberg and head of the Ethnological Museum at Stuttgart), Dr. von den Steinen and Professor Seler.

As a committee to edit the proceedings of the New York congress for publication, Professor Putnam (chairman), Dr. Saville and Dr. Boas were appointed. Special efforts are to be made to interest the Spanish American countries in the Stuttgart Congress.

After the last paper to be read was over, Dr. von den Steinen took the platform, congratulated President Jesup on the success of the congress so largely due to his efforts, and called for three cheers for him, which were heartily given. Thus ended what was perhaps the most successful of all the Congresses of Americanists, and in the

general satisfaction the 'unpleasantness' of Wednesday and its division of the Mexican delegates was soon forgotten, Vice-President Chavero remaining to receive the cordial adieus of his colleagues of other lands and tongues.

At the conclusion of the congress a considerable number of the delegates visited Pittsburgh, Columbus, Fort Ancient, Chicago and Washington. In the capital city of the nation (where they arrived Tuesday, October 28) they were entertained by the Cosmos Club and a reception committee of prominent Washingtonians, presented to the President at the White House, and made at home in other ways, with dinners, luncheons, etc. Among these functions was a dinner give for Señor Chavero by the Mexican Ambassador, Señor de Aspiroz, and a dinner at the Arlington for the delegates, at which Dr. Chas. D. Walcott presided and Dr. W J McGee was toastmaster. A few of the delegates will remain some time longer in this country, but most of them will soon leave for home.

In a report of a scientific gathering a few personal remarks may not be entirely out of place. Among the foreign delegates who made the strongest and most favorable impression upon their English-speaking colleagues must be mentioned Dr. Karl von den Steinen, colaborer with Bastian at the University of Berlin, and his probable successor, who, with Eduard Seler (for the German Government), the archeologist and Mayan epigrapher, ably represented their native land, and Dr. Juan B. Ambrosetti, of Buenos Aires, who was the envoy of the Argentine Republic and the Museo Nacional de La Plata. By reason of their charming individualities and the excellent work which they have accomplished in their respective fields of research, these two men of science appealed in particular to the anthropologists of the United States, whose methods and investigations, espe-

cially as exemplified in the 'Reports' of the Bureau of American Ethnology and the U. S. National Museum, the 'Memoirs' of the American Museum of Natural History, the publications of the Peabody Museum, etc., they fully appreciated. Dr. Ambrosetti, in the numerous extra-forensic discussions with prominent representatives of the United States, was enthusiastic in his commendation of the 'American method,' the adoption of which in the Argentine means a rich harvest by the time the congress meets in the capital city of the great South American republic.

Other distinguished foreigners, whose short stay will be remembered with pleasure by their colleagues of the United States, were Dr. Hjalmar Stolpe, of Stockholm, the representative of the Royal Ethnographical Museum, well known as about the first serious student of the ethnological aspect of decorative art; J. L. van Panhuys, the author of several investigations among the Carib Indians of Guiana, who in the absence of Dr. J. D. E. Schmeltz, the delegate originally appointed by the government, was the official representative of the Netherlands at the congress; C. V. Hartman, the delegate of the Svenska Sällskapet for Antropologi och Geografi, who laid before the members the sumptuously printed account of his archeological researches in Salvador and Costa Rica; David Boyle, of Toronto, the creator of the Provincial (Ontario) Archeological Museum, of which he was the official representative; Léon Lejéal, of the Collège de France, who occupies the chair recently founded by the Duc de Loubat; A. P. Maudslay, the authority on Mayan hieroglyphics, who came as the delegate of the Anthropological Institute of Great Britain and Ireland (London); Waldemar Bogoras, whose investigations in northeastern Asia for the Jesup North Pacific Expedition are in process of publication, a typical Russian

with a good command of English, etc. H. Pittier de Fabrega, one of the delegates from Costa Rica, has made special studies of the Indian languages of his country, while his colleague, Juan F. Ferraz, published in 1892 a dictionary of 'Nahuatlismos' (Aztec words in use in Costa Rican Spanish). Mexico was well represented; besides Alfredo Chavero, Nicolas Léon and Leopoldo Batres, the official delegates of the Federal Government (the first as the personal envoy of President Diaz), there were present from the State of Mexico Alonzo Fernandez, and from the State of Oaxaca, Francisco Belmar. Señor Chavero is a president of the Mexican Chamber of Deputies and the representative in that body of the President of the Republic; Nicolas Léon is the Director of the Anthropological Section of the Museo Nacional de México and a student of the language of the Tarascans and other Amerinds; Francisco Belmar, a lawyer of Oaxaca, has published many valuable monographs on the native tongues of that state. It is much to be regretted that Antonio Peñafiel, the distinguished Mexican geographer and ethnologist, could not be present at the meeting. Peru, Ecuador, Bolivia, Chili, Brazil, Venezuela and Colombia had no delegates at the congress, although there are Americanists of note in those countries, like Rodolfo Lenz of Santiago de Chile, Dr. Nina-Rodriguez of Bahia (Brazil), Dr. M. A. Muñoz of Lima, and others, whose presence would have given the New World section of the delegates more of a Pan-American character. Some of the delegates from the United States were prevented by various causes from attending the Congress. Duties in Washington and the preparations for the reception of the members of the congress on their visit to that city kept away both Dr. Walter Hough and Dr. J. Walter Fewkes. Dr. Carl Lum-

holtz was absent in Europe, and Dr. A. Hrdlička engaged in field-work.

A pleasant and commendable feature of the congress was the fact that all the time was not taken up by the reading of papers and the transaction of routine business, the evenings, when not devoted to some social courtesy extended to the members by individuals or institutions, being left free to be spent in that personal intercourse and discussion of topics of a common interest which so often do even more for science than the formal exercises of a great meeting. Men of science, no less than other human beings, are frequently at their best during the after-dinner hour.

ALEXANDER F. CHAMBERLAIN.

CLARK UNIVERSITY,

FIFTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

THE Fifth International Congress of Applied Chemistry will begin its sessions in Berlin on May 31, 1903.

The permanent Committee on Organization holding over from the meeting of the Fourth Congress in Paris, has designated Professor Clemens Winkler as President of Honor and Professor Otto N. Witt as President of the German Committee.

At the request of this committee and in accordance with the resolution passed by the Council of the American Chemical Society, the President of the Society has appointed the following American Committee on Organization:

H. W. Wiley, Chairman, Chief of Bureau of Chemistry, Department of Agriculture, Washington, D. C.

Section I.—Analytical Chemistry, Apparatus and Instruments: Dr. W. F. Hillebrand, Chemist, U. S. Geological Survey, Washington, D. C.; Otto P. Amend, Dealer in Chemical Apparatus and Instruments, 205 Third Avenue, New York, N. Y.; Charles Baskerville, Ph.D., F.C.S., Smith Professor of General Chemistry and Director of the Laboratory, University of North Carolina, Chapel

Hill, N. C.; E. E. Ewell, Assistant Chief of Bureau of Chemistry, Department of Agriculture, Washington, D. C.; William A. Noyes, Professor of Chemistry, Rose Polytechnic Institute, Terre Haute, Ind.

Section II.—Chemical Industries of Inorganic Products: Dr. Edward Hart, Professor of Chemistry, Lafayette College, Easton, Pa.; J. D. Pennock, Chief Chemist, Solvay Process Co. and Semet-Solvay Co., Syracuse, N. Y.; Geo. C. Stone, Chief Engineer, New Jersey Zinc Co., 11 Broadway, New York, N. Y.

Section III.—Metallurgy, Mining and Explosives: Charles E. Munroe, Ph.D., Professor of Chemistry, The Columbian University, Washington, D. C.; A. E. Knorr, Chief Chemist, Baltimore Copper and Smelting and Rolling Co., Canton, Baltimore, Md.; Francis C. Phillips, Professor of Chemistry, Western University, Allegheny, Pa.; W. B. Rising, Professor of Chemistry, University of California, Berkeley, Cal.

Section IV.—Chemical Industries of Organic Products, (a) Organic Preparations including coal-tar products, (b) Dye Stuffs and their uses: William McMurtrie, Consulting Chemist, Royal Baking Powder Co., New York, N. Y.; J. Merritt Matthews, Ph.D., Professor in Charge of Chemical Dyeing Dept., Philadelphia Textile School, Philadelphia, Pa.; Clifford Richardson, Director of the New York Testing Laboratory, Long Island City, N. Y.; Samuel P. Sadtler, Ph.D., LL.D., Consulting Chemist and Honorary Professor of Chemistry, Franklin Inst. of Philadelphia, 10th and Chestnut Sts., Philadelphia, Pa.

Section V.—Sugar Industry: Dr. F. G. Wiechmann, Consulting Chemist, American Sugar Refining Co., Box 79, Station W, Brooklyn, N. Y.; Arno Behr, Ph.D., Chemist, Pasadena, Cal.; David L. Davoll, Jr., Chief Chemist, Peninsular Sugar Refining Co., Caro, Mich.; W. D. Horne, Ph.D., Consulting Chemist, The National Sugar Refining Co. of New Jersey, Yonkers, N. Y.; G. L. Spencer, Chief of Sugar Laboratory, Bureau of Chemistry, Dept. of Agriculture, Washington, D. C.

Section VI.—Fermentation and Starch Manufacture: Max Henius, Ph.D., Director, American Brewing Academy and the Scientific Station for Brewing of Chicago, Chicago, Ill.; Charles E. Pellew, E.M., Adjunct Professor of Chemistry, Columbia University, New York, N. Y.; Alfred Springer, Ph.D., Chemist, 312 E. 2d St., Cincinnati, O.

Section VII.—Agricultural Chemistry: B. W. Kilgore, Director, North Carolina Agricultural

Experiment Station and State Chemist, Raleigh, N. C.; Henry Adam Weber, Ph.D., Professor of Agricultural Chemistry, Ohio State University, Columbus, O.; Chas. D. Woods, Professor of Agriculture, University of Maine, and Director of Maine Agricultural Experiment Station, Orono, Maine; B. B. Ross, Professor of Chemistry, Alabama Polytechnic Institute and State Chemist of Alabama, Auburn, Ala.

Section VIII.—Hygiene, Chemical and Pharmaceutical Chemistry; Foods: M. E. Jaffa, Assistant Professor of Chemistry, University of California, Berkeley, Cal.; W. O. Atwater, Professor of Chemistry, Wesleyan University, Middletown, Conn., Chief of Nutrition Investigation, Office of Experiment Stations, U. S. Department of Agriculture; E. A. de Schweinitz, Chief Biochemic Division, Department of Agriculture, Dean and Professor of Chemistry, Columbian University Medical School, Washington, D. C.; Walter S. Haines, Professor of Chemistry, Pharmacy and Toxicology, Rush Medical College, Chicago, Ill.; Edward Kremers, Professor of Pharmaceutical Chemistry, Director of School of Pharmacy, University of Wisconsin, Madison, Wis.; John Marshall, Professor of Chemistry and Toxicology, University of Pennsylvania, Philadelphia, Pa.; John Uri Lloyd, Ph.D., LL.D., Professor of Chemistry, Eclectic Medical Institution, Cincinnati, O.; W. P. Mason, Professor of Chemistry, Rensselaer Polytechnic Institute, Troy, N. Y.

Section IX.—Photochemistry: Dr. L. H. Friedburg, Late Professor of Chemistry and Toxicology at the Flower Hospital Medical College, New York; Address, 529 West 147th St., New York, N. Y.; Dr. Peter T. Austen, F.C.S., Chemical Expert, 80 Broad St., New York, N. Y.; Leo Baeckeland, D.Sc., Research Chemist, 'Snug Rock,' N. Broadway (Harmony Park), Yonkers, N. Y.

Section X.—Electrochemistry and Physical Chemistry: Charles A. Doremus, M.D., Ph.D., Assistant Professor of Chemistry, College of the City of New York, N. Y.; W. D. Bancroft, Assistant Professor of Physical Chemistry, Cornell University, Ithaca, N. Y.; Edgar F. Smith, Professor of Chemistry, University of Pennsylvania, Philadelphia, Pa.; C. F. Chandler, Professor of Chemistry, Columbia University, New York, N. Y.; A. A. Noyes, Professor of Theoretical and Organic Chemistry, Massachusetts Institute of Technology, Boston, Mass.

Section XI.—Legal and Agricultural Problems in Connection with the Chemical Industries: Dr. J. W. Mallet, Professor of Chemistry, University of Virginia, Charlottesville, Va.; Charles B. Dud-

ley, Chief Chemist, Pennsylvania R. R. Co., Altoona, Pa.; Albert B. Prescott, Director of Chemical Laboratory, University of Michigan, Ann Arbor, Mich.; S. P. Sharples, Analytical and Consulting Chemist, 13 Broad Street, Boston, Mass.; A. H. Todd, Manufacturing Chemist and Distiller of Essential Oils, Kalamazoo, Mich.

A few other gentlemen have been appointed on the committee, but their acceptances have not yet been received. It is hoped that American chemists will become members of this Fifth Congress in large numbers, even if they are not able to be present in person, and that as many as possible will attend. Both those who can attend and those who are not able to go are urged to send papers.

The work of the Congress has been organized in the sections given above. The members of the committee in each section should endeavor particularly to promote the interest of that branch of the science which specially belongs to that section.

The fee for membership is 20 Marks or \$4.76. To avoid the trouble of sending separate postal orders for this sum the chairman of the committee, Dr. Wiley, will undertake to transmit to Berlin the membership fees of American chemists who wish to avail themselves of this opportunity. Those desiring, therefore, to become members may send their personal check for \$4.76 and nine cents to cover postage, postal orders, etc., in all \$4.85, to Dr. H. W. Wiley, Chief of the Bureau of Chemistry, Department of Agriculture, Washington, D. C., who will give them a receipt for the same while waiting for an official receipt from the treasurer at Berlin.

If reductions in steamship rates can be obtained a notice to the effect will be published in *SCIENCE* and in the *Journal of the American Chemical Society*. Members attending the Congress should leave the United States not later than the 15th of May by slow steamer, nor the 20th of May by fast steamer.

The official announcements and other circular matter connected with the Congress will be distributed through the American committee as soon as the documents are received from Berlin. Any members of the society to whom these circulars may not be sent can secure them by writing to the chairman of the American committee.

Chemists not members of the American Chemical Society are also cordially invited to participate in the Congress both as members and as authors of papers, and the same courtesies will be extended to them, if so desired, as are offered above.

H. W. WILEY,

*Member of Permanent Committee on
Organization and Chairman of
American Committee.*

SCIENTIFIC BOOKS.

RECENT PAPERS ON THE EMBRYOLOGY, STRUCTURE AND HABITS OF LIVING BRACHIOPODA.

1. *Observations on Living Brachiopoda.* By EDWARD S. MORSE. *Memoirs Boston Soc. Nat. Hist.*, Vol. 5, No. 8, 1902. 4to. Pp. 313-386; pls. 39-61.
2. *The Embryology of a Brachiopod, Terebratulina septentrionalis Couthouy.* By EDWIN G. CONKLIN. *Proc. Amer. Phil. Soc.*, Vol. 41, No. 168, 1902. 8vo. Pp. 41-76; pls. 1-10.
3. *On the Development of Lingula anatina.* By NAOHIDÉ YATSU. *Jour. College of Science, Imp. Univ. Tōkyō, Japan*, Vol. 17. Art. 4, 1902. 8vo. Pp. 1-112; pls. 1-8.
4. *Notes on the Histology of Lingula anatina Brugière.* By NAOHIDÉ YATSU. *Ibid.*, Vol. 17, Art. 5, 1902. 8vo. Pp. 1-29; pls. 1, 2.
5. *On the Habits of the Japanese Lingula.* By NAOHIDÉ YATSU. *Annotationes Zoologicæ Japonensis*, Vol. 4, Pt. 2, 1902. 8vo. Pp. 61-67.

The publication of studies on living Brachiopoda seems to have become almost epidemic during the present year. Sporadic papers have appeared during the past ten years, but no marked infection has occurred until now.

The results are most satisfactory, for the contributions here noticed are of a high degree of excellence and constitute a decided advance in our knowledge of the habits, anatomy and embryology of this interesting class, whose culmination was attained far back in the Paleozoic era.

Professor Morse possesses the unique distinction of having first studied the early stages and embryology of a brachiopod. His observations on the embryology of *Terebratulina* and the systematic position of the Brachiopoda were published thirty years ago. The importance of the subject led him to visit Japan, where the adjacent seas offer the greatest inducement to the student of the recent species of this class. The allurements of Japanese art have prevented the publication of the studies then made until the present time. It is quite remarkable that so few of his observations have been anticipated during the intervening years, though the publications of Joubin and Blochmann have indeed covered many of the details relating to *Lingula* and *Discinisca*.

Morse's observations refer principally to the genera *Lingula*, *Glottidia*, *Discinisca*, *Hemithyris*, *Dallina*, *Terebratalia* and *Terebratulina*. The points of especial interest comprise the discussion of the otocysts, pharyngeal glands, the accessory hearts of Hancock, the strand-like spermaries, the pallial circulation, the life attitudes of different forms, and particularly the varied and graceful movements of the brachia. The strand-like spermaries and the pharyngeal glands are characters heretofore undescribed, and further details are given regarding the external glands first described by the author. The presence of otocysts in *Lingula* and *Glottidea* are definitely shown although Blochmann has doubted their existence in these genera. The organs described by Hancock as the 'heart' and the 'accessory hearts' have been frequently investigated by various observers, but no final conclusion has been reached. The author shows that they cannot well belong to the circulatory system, but must be regarded as in some way connected with the genitalia, though their precise functions have not been

determined. The plates accompanying this memoir were drawn by the author in his usual clear and artistic manner. They represent just what is intended to be shown, and are evidently depictions of natural objects.

Conklin's embryology of *Terebratulina septentrionalis* (2) presents an excellent illustration of the results obtained by modern methods. Owing to the opacity of the embryos and to the absence of serial sections, good microtomes and other accessories, Morse during 1871-73 was able to show mainly the external modifications in the developing embryo. His observations, however, were very thorough and complete.

Conklin describes in detail the egg and its cleavage, gastrulation and the formation of the body layers and cavities, the orientation of the embryo, and the development and organization of the larva.

The constrictions of the cephalula, hitherto supposed to mark distinct segments, are shown to be produced by the anterior and posterior mantle furrows, but at no time do they form true septa dividing the coelom. The author, after reviewing the real and supposed resemblances between the larval and embryo brachiopods and other organisms, concludes that the relationship between *Phoronis*, the Bryozoa, and the Brachiopoda, is sufficiently close to warrant their being placed in the same phylum, though not in the same class.

All our knowledge regarding the embryology of the Brachiopoda has hitherto practically been confined to the group known as Articulata. The work of Yatsu (3) is, therefore, of great interest and value, since it relates to *Lingula*, the living and almost unchanged representative of the most ancient types. The developmental characters of *Lingula* are in many respects quite different from those of any brachiopod previously studied. The three-lobed cephalula stage of the neoembryo, so characteristic of *Cistella*, *Lacazella* and *Terebratulina*, is not developed in *Lingula*, which does not attain more than a two-lobed condition. Also, the posterior lobe is not the caudal as in those genera, but constitutes the thoracic division. *Cistella*, *Lacazella*, etc., undergo a metamorphosis in passing from the

neoembryonic to the typembryonic condition, consisting of the reflexing of the mantle lobes forward over the anterior division. This change is absent in *Lingula*, and the mantle lobes simply grow anteriorly. This difference has an especial significance in the development of the shell, for in *Cistella*, etc., the shell is developed from what was originally the inner side of the mantle lobes, while in *Lingula* it is secreted by the outside. The author further considers that the pedicle is embryologically and morphologically distinct from the pedicle of the articulate brachiopods.

The embryonic and early post-embryonic stages are fully described, together with full details and illustrations of the various organs and structures. As a whole, no single species of brachiopod has heretofore received so complete and extended treatment along these lines of research.

The two other papers by this author (4, 5) relate to the histology and habits of *Lingula*. New facts are given, showing the extraordinary power of resistance to unfavorable conditions, which has doubtless been a potent factor in preserving the genus since Cambrian times.

It is noteworthy that in all the standard literature on the Brachiopoda no notice has been taken of the earliest American publication relating to the anatomy of these animals. It is contained in a 'Text-book of Vegetable and Animal Physiology,' by Henry Goadby, published in New York in 1858. One chapter is devoted to the nutrition in the Brachiopoda and another to a description of their nervous and circulatory systems. Inasmuch as Goadby's observations were based upon original dissections and studies, their claims for a place in the literature of brachiopod research are perfectly valid. C. E. BEECHER.

General Investigations of Curved Surfaces.

By KARL FRIEDRICH GAUSS. Translated with Notes and a Bibliography by JAMES CADALL MOREHEAD, A.M., M.S., and ADAM MILLER HILTEBEITEL, A.M. The Princeton University Library. 1902. Quarto. Pp. viii + 127.

By the liberality of the Princeton Library Publishing Association and the alumni of

Princeton University this book is sold at less than the cost of publication. English-speaking mathematicians will be certainly grateful for the public spirit shown by Princeton University and its alumni. While it is true that most mathematicians can read memoirs in foreign languages, yet its difficulty often deters them from doing so when they are not directly interested in the subject. There is an ease in one's own idiomatic forms of expression which makes the reading much pleasanter, and if to such translations are added notes of interest and bibliographies of value, then their usefulness is unquestionable. One likes to add such works to one's own library where they can be an incentive to a broader knowledge. Similar translations to the one in hand, such as of the work of Lie which leads up to and includes his theory of transformation groups, would be equally valuable and acceptable.

The translators present us first with Gauss's paper of 1827, and his own abstract of the same. Here, in 47 pages, is the original development of the theory of surfaces, relating principally to questions of curvature, treated mainly by Gauss's own method of curvilinear coordinates, which formed the source of many remarkable theorems, such as that the measure of curvature of a surface remains unchanged by bending it without stretching or breaking. The notes to this paper occupy 28 pages, and give historical information, explanations and omitted figures and proofs of many theorems.

Next follows the paper of 1825, which was not published until after the death of Gauss. It is his less finished and incomplete first paper on the subject. Curvilinear coordinates are not used; there is an introduction which treats of curvature in a plane; and, altogether, it shows the manner in which many of the ideas of the more complete paper were evolved. There are 29 pages in this paper, followed by 4 pages of notes. Then comes a bibliography of 11 pages, containing 343 titles, which is limited to works which use Gauss's methods in the subjects of curvilinear coordinates, geodesic and isometric lines, curvature, deformation, orthogonal systems, and the general theory of surfaces, but

not including minimal surfaces, congruences, etc. A few corrections of misprints and an additional note appear on the last page.

It seems unnecessary to give this review a learned appearance for the readers of SCIENCE, by entering into a discussion of details of theorems and formulas. The work of Gauss is of primary importance in the theory of surfaces, and these papers are classical in the subject. What I wish is to note the usefulness and importance of this translation of the work of an original master to all who desire to study the subject, and to express what I conceive to be the general obligations of American mathematicians to the translators for their careful labors and to Princeton University and its alumni for their thoughtfulness and generosity in its publication.

ARTHUR S. HATHAWAY.

Acht Vorträge über Physikalische Chemie, gehalten auf Einladung der Universität Chicago. By PROFESSOR J. H. VAN'T HOFF. Braunschweig, F. Vieweg and Sohn. 1902.

Nothing written by the great master of modern physical chemistry can fail to be of interest and value. The excellently lucid treatment of the subject to be seen in these lectures will undoubtedly assist in dispelling that remnant of distrust concerning the new chemistry which still sometimes lurks in conservative minds. To those conversant with the author's other works, these lectures will bring nothing new except the details of their presentation, which covers a wide field with the help of a few typical examples. The lectures treat in succession the relation of physical chemistry to pure chemistry (especially inorganic), to technical chemistry, to physiological chemistry and to geology. They call attention in a striking manner to the far-reaching influence of the new ideas. Among other examples the phase relations of iron and steel, and of carnallite, are discussed in detail in their appropriate places, and the fundamental importance of osmotic phenomena and of enzymes is especially emphasized in the two chapters upon physiological chemistry. To Americans these lectures are especially interesting because of their having formed one of

the chief reasons for Dr. van't Hoff's welcome visit to the United States in 1901.

THEODORE W. RICHARDS.

SOCIETIES AND ACADEMIES.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE fifty-second annual meeting of the American Association for the Advancement of Science, and the first of the Convocation Week meetings, will be held in Washington, D. C., December 27, 1902, to January 3, 1903. The retiring president is Professor Asaph Hall, U.S.N., and the president elect, President Ira Remsen, Johns Hopkins University. The permanent secretary is Dr. L. O. Howard, Cosmos Club, Washington, D. C., and the local secretary, Dr. Marcus Benjamin, Columbian University, Washington, D. C. President Roosevelt is honorary president of the local committee. The preliminary program with information in regard to hotel headquarters, railway rates, etc., will be found in the issue of SCIENCE for November 21. The following scientific societies will meet at Washington in affiliation with the Association:

The American Anthropological Association will hold its first regular meeting during Convocation Week in affiliation with Section H of the A. A. A. S. President, W J McGee; secretary, George A. Dorsey, Field Columbian Museum, Chicago, Ill.

The American Chemical Society will meet on December 29 and 30. President, Ira Remsen; secretary, A. C. Hale, 352A Hancock street, Brooklyn, N. Y.

The American Folk-lore Society will meet in affiliation with Section H of the A. A. A. S. President, George A. Dorsey; vice-presidents, J. Walter Fewkes, James Mooney; secretary, W. W. Newell, Cambridge, Mass.

The American Microscopical Society will probably hold a business meeting on December 29. President, E. A. Birge, Madison, Wis.; secretary, H. B. Ward, University of Nebraska, Lincoln, Nebr.

American Morphological Society will meet on December 30 and 31. President, H. C. Bumpus; vice-president, G. H. Parker; secretary and treasurer, M. M. Metcalf, Woman's College, Baltimore, Md.

The American Philosophical Association will meet on December 30 and 31 and January 1. Secretary, H. N. Gardiner, Northampton, Mass.

The American Physical Society will meet in affiliation with Section B of the A. A. A. S. President, Albert A. Michelson; secretary, Ernest Merritt, Cornell University, Ithaca, N. Y.

The American Physiological Society will meet on December 30 and 31. President, R. H. Chittenden; secretary, F. S. Lee, Columbia University, New York, N. Y.

American Psychological Association will meet on December 30 and 31 and January 1. President, E. A. Sanford; secretary and treasurer, Livingston Farrand, Columbia University, New York, N. Y.

American Society of Naturalists will meet on December 30 and 31. President, J. McK. Cattell; vice-presidents, C. D. Walcott, L. O. Howard, D. P. Penhallow; secretary, R. G. Harrison, Johns Hopkins University, Baltimore, Md.

Association of American Anatomists will meet on December 30 and 31. President, G. S. Huntington; vice-president, D. S. Lamb; secretary and treasurer, G. Carl Huber, University of Michigan, Ann Arbor, Mich.

Association of Economic Entomologists will meet on December 26 and 27. President, E. P. Felt; secretary, A. L. Quaintance, College Park, Md.

Astronomical and Astrophysical Society of America will meet during Convocation Week, in affiliation with Section A of the A. A. A. S. President, Simon Newcomb; secretary, George C. Comstock, University of Wisconsin, Madison, Wis.

Botanical Society of America will meet on December 31 and January 1. President, B. T. Galloway; secretary, D. T. MacDougal, New York City.

Botanists of the Central and Western States will meet on December 30. Committee in charge of the meeting, John M. Coulter, University of Chicago; D. M. Mottier, University of Indiana, Bloomington, Ind.; Conway MacMillan, University of Minnesota, Minneapolis, Minn.

Geological Society of America will meet on December 29, 30 and 31. President, N. H. Winchell; vice-presidents, S. F. Emmons, J. C. Branner; secretary, H. L. Fairchild, University of Rochester, Rochester, N. Y.

The National Geographic Society will hold a meeting during Convocation Week. President, A. Graham Bell; vice-president, W J McGee; secretary, A. J. Henry, U. S. Weather Bureau, Washington, D. C.

Naturalists of the Central States will meet on December 30 and 31. Chairman, S. A. Forbes; secretary, C. B. Davenport, University of Chicago, Chicago, Ill.

Society of American Bacteriologists will meet on December 30 and 31. President, H. W. Conn; vice-president, James Carroll; secretary, E. O. Jordan, University of Chicago, Chicago, Ill.; council, W. H. Welch, Theobald Smith, H. L. Russell, Chester, Pa.

Society for Plant Morphology and Physiology will meet during Convocation Week. President, V. M. Spalding; vice-president, B. D. Halsted; secretary and treasurer, W. F. Ganong, Smith College, Northampton, Mass.

Society for the Promotion of Agricultural Science will meet during Convocation Week. President, W. H. Jordan; secretary, F. M. Webster, Urbana, Ill.

Zoologists of the Central and Western States will meet during Convocation Week. President, C. B. Davenport, University of Chicago.

SECTION OF GEOLOGY AND MINERALOGY. NEW YORK ACADEMY OF SCIENCES.

At the meeting of the Section at the American Museum of Natural History on October 20, the following program was presented:

Wallace Goold Levison exhibited to the Section four specimens of gneiss obtained from the bed-rock in certain deep excavations at the southern end of Manhattan Island. One of these was collected July 20, 1902, from a depth of fifty feet below the surface at the corner of Broad and Exchange Streets; the second was collected in the excavations at 40 Exchange Place, forty-five feet below the surface, on July 25; two others were collected at 43-49 Exchange Place, forty-five feet below the surface, on July 25. Mr. Levison also showed specimens of serpentine from boulders found on June 19 in the excavations for the Stock Exchange building on Broad Street, between forty and sixty feet below the surface.

In the absence of the author, the paper by Professor William H. Hobbs was read in somewhat condensed form by the Secretary of the Section. The paper was accompanied by a wealth of detailed observations too extensive for reproduction, but a summary of his conclusions is as follows:

In his introduction the author called atten-

tion to the unusual opportunities now offered for studying the geology of Manhattan Island through the numerous great engineering projects now being carried forward. The waterways surrounding Manhattan Island are deep cañons, with a depth of nearly 200 feet in the East River and 300 feet or more in the North River, now partly filled with drift deposits and depending on the velocity of the tidal currents.

In 1865 Stevens advanced the theory that the river channels were along lines of faults ('longitudinal and transverse fractures'). Newberry regarded the East River as the lowest reach of the Housatonic River before it discharged its waters into the Hudson, which was then the outlet of the Laurentian series of lakes, and he considered the Harlem River with Spuyten Duyvil Creek a smaller tributary of the Hudson.

Dana believed that the relatively easy solution of certain beds of limestone determined the position of the river channels. This view of Dana's has been supported by Kemp and Merrill, while Gratacap rejects the theory advanced by Stevens.

Professor Hobbs finds that no correspondence can be established between the directions of the belts of limestone or dolomite and of the New York water front, except within the stretch from Kingsbridge to Macombs Dam Bridge. Along this line too the observed facts point to the occurrence of a narrow strip of limestone dropped down between nearly vertical faults. The sections of the Harlem River which are furnished by the bridges across it show clearly that it is not a simple erosion valley resulting from cutting by the stream. The bed of the stream is marked by sudden change of level, and the Harlem seems to have chosen its course quite independently of the position of ridges of the harder gneiss. Under the East River limestone has been found at but two localities—under the channel east of Blackwells Island and in one of the drill holes underneath the Manhattan pier of East River Bridge No. 3. The limestone east of Blackwells Island is enclosed between parallel fault walls, and appears to have been dropped down along them. The numerous

occurrences, however, of gneiss and gneiss only along, in and under the East River leaves little doubt that the main portion of the bed is composed of this rock.

Regarding the bed-rock beneath the North River, comparatively little is known, but the origin of its channel is sufficiently accounted for by its position along the contact of the Newark system with the crystallines. This contact seems surely to be a fault-border on account of its markedly rectilinear extension, the great scarp of basalt, the much inferior position of the newer terranes, and the evidence derived from the boring along the route of the proposed tunnels of the Pennsylvania, New York and Long Island railroad company.

The author holds that the directions of the channels of Spuyten Duyvil Creek and Harlem and East Rivers have been determined largely by lines of jointing and displacement. Manhattan Island borders directly upon the Newark area, in which the existence of a network of faults has been established by the work of several observers, and the network probably extends beyond the limits of the area. The striking rectilinear outlines of the island, especially of the northern half of it, and its topographic development are favorable to the view that it represents an orographic block left standing between down-thrown strips of the crust. The rectilinear gorge of the upper Harlem between Washington Heights and Fordham Heights is continued, so far as its western wall is concerned, some two and a half miles south of the river. It is parallel to the direction of the scarp of the Palisades, and of the Hudson. Besides the cross fractures indicated by the different parts of the Harlem River, which were pointed out by Stevens, several other cross fractures on and about Manhattan Island were pointed out by the same author. Dana also considered that the Manhattanville cross valley was formed by a cross fracture. A considerable number of faults has been definitely established. Their directions correspond in general to the elements in the course of the river channels. The exceptions to this rule are the fissures in the East River east and west of Blackwells Island.

The author went on to cite a number of faults which have been disclosed by numerous borings and tunnels, and, in closing, called attention to the fact that the buried rock-surface in the lower part of the city (south of Twenty-third Street), as well as that below the area of the Harlem flats (north of One Hundred and Tenth Street and east of Eighth Avenue), is characterized by the most abrupt changes of level. In his opinion the area of these portions of the island represents orographic blocks depressed by faults, reefs of gneiss and limestone rising along the Harlem area, while reefs of gneiss alone characterize the southern district.

Professor Hobbs' paper was discussed briefly by Professors Kemp, Dodge and Stevenson, and it was evident that the author's theory would not be accepted without considerable further investigation.

At the outset of his paper on Bingham Cañon, Professor Kemp stated that the article was not a formal one for publication, and that he did not wish to forestall in any degree the forthcoming Bingham folio by Mr. Boutwell, of the United States Geological Survey. He then described the geological formations in the vicinity of large mines. These formations embraced the great section of quartzite with smaller exposure of limestone, and with intruded masses of eruptive rocks which range from pronounced porphyries to granites. At least three kinds of eruptives can be distinguished. The author described in outline the faults and geological relations of the ores, and stated that the ores especially favored the contact of the eruptive rocks with the quartzites. The evidences of contact metamorphism between the porphyries and the limestones were commented upon. The ores in the great porphyry dike on the claims of Colonel Wall were described, and were stated to be secondary in their origin—that is, they were probably introduced in solution into a mass of crushed eruptive rock. The data for the paper were gathered in connection with the field instruction given to a class of students the past summer. The paper was illustrated by means of lantern slides, maps and specimens.

In accordance with the provisions of the new constitution of the Academy, the officers of the Section for the year 1903 were elected at this meeting. They were: *Vice-President and Chairman*, Professor James F. Kemp, of Columbia University; *Secretary*, Dr. Edmund O. Hovey, of the American Museum of Natural History.

EDMUND O. HOVEY,
Secretary.

THE NEW YORK ACADEMY OF SCIENCES. SECTION
OF ASTRONOMY, PHYSICS AND CHEMISTRY.

At the meeting of the Section on November 3, Mr. G. B. Pegram read a paper discussing some experiments of his on the electrolysis of solutions of radioactive salts, in course of which he found that when a solution of a thorium salt is electrolyzed, using platinum electrodes, a temporary radioactivity is imparted to the anode rather than to the kathode, which is remarkable in view of the fact that in the air near dry thorium compounds a negatively charged body, corresponding to the kathode, becomes radioactive, while a positively charged body, corresponding to the anode, is not made active. The activity of the anode used in the electrolysis of a thorium nitrate solution can become much more intense, for a given extent of surface, than that shown by a thick layer of thorium oxide.

The solution under electrolysis rapidly loses its power of imparting radioactivity, so that after four hours of electrolysis with a current of half an ampère, a solution of 20 g. of thorium nitrate in 100 c.c. water had lost 95 per cent. of its power of imparting activity to the anode. This radioactivity of the anode increases for a while after being taken out of the solution, then its intensity falls off at the rate of half its value in eleven hours, which has been shown by Professor E. Rutherford to be the rate of decay in the case of surfaces made active by exposure to the emanation from a dry thorium compound. The radiation is not homogeneous, as is shown by a study of its absorption by successive layers of metal foil.

The activity of the anode seems to increase directly with the concentration of the solution for short periods of electrolysis, but its

relation to the current strength and the duration of the electrolysis appears to be less simple.

Solutions containing radium impart activity to both anode and kathode, but this activity decays very rapidly, falling off half its value in about 35 minutes.

S. A. MITCHELL,
Secretary of Section.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY.

The society held its 143d meeting Tuesday evening, November 11, in Person Hall, University of North Carolina.

Dr. J. E. Mills presented a paper on a 'Suggested Modification of the Law of Dulong and Petit,' in which he stated that if γ denote the ratio of the specific heat of a gas at constant pressure to the specific heat at constant volume, it was shown that γ could be defined in terms of the translational energy of a molecule and the internal energy of the molecule. Hence γ has a meaning for liquid and solid bodies capable of a physical interpretation. Upon this basis there was deduced an equation governing the specific heat of a body and applicable to the solid, liquid or gas. The deduced equation holds so far as measurements have been made. If the theory be true it will explain certain discrepancies and extend the law of Dulong and Petit.

Dr. W. C. Coker spoke of a 'New Species of Mosquito.' In abstract he stated that, while studying the mosquitoes of South Carolina in the summer of 1901, larvæ of peculiar appearance were found in a small pool near a well, and brought into the house. After about three days imagoes of both sexes emerged which proved to be of a new species. They were taken alive to Washington and there studied by Mr. D. W. Coquillett, who describes them as a species of *Psorophora*. He gives them the name *P. howardii* in honor of the well-known entomologist, Dr. L. O. Howard.

Eggs of this species obtained by Dr. Howard from the individuals taken to Washington proved to be practically identical with those of *P. ciliata* procured by Dr. Coker in South

Carolina for the first time. To get the eggs of *P. ciliata* the following method was used: A horse was driven into a low place inhabited by these insects and from him specimens loaded with blood were transferred to a jar. They were then put into a tin bucket with a little water in the bottom and covered with netting. They were fed daily with blood from the hand, and after about five days their eggs were found in the water. The eggs lie separately, like those of *Anopheles*. Contrary to expectation and report, *Anopheles* was found breeding abundantly in a barrel.

Dr. J. E. Duerden gave an account of his work on 'Boring Algæ as Agents in the Disintegration of Corals.' The corolla of about thirty species of West Indian corals, decalcified in the course of a morphological study of the polyps, all yielded a fluffy mass made up of filamentous algæ. The algæ were present in greatest number and variety in the older dead parts of corals, especially in so-called 'rotten coral,' but were also found throughout the part of the skeleton directly clothed with the polypal tissues, the only exception being at the tips of rapidly growing branches. The filaments occurring most frequently belong to two species of green algæ and a red alga; where present in quantity the former give a green color to the freshly macerated corallum, and the latter a pink tinge. Similar boring algæ were also obtained from many Pacific corals.

The algæ attack the calcareous skeleton of corals in the early stages of development, and their ramifications keep pace with its growth. Penetration of the hard coral is evidently affected by chemico-physical means, and their presence in such abundance results in a serious corrosive action, both superficially and internally; when assisted by other boring organisms, such as sponges and molluscs, it must lead to the rapid disintegration of dead coral blocks. Attention was drawn to the bearing of such disintegration upon the various theories associated with the formation of coral reefs.

CHAS. BASKERVILLE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE KINETIC THEORY AND THE EXPANSION OF A COMPRESSED GAS INTO A VACUUM.

MR. FIREMAN, in his reply to my note regarding his communication to the American Association, states that I misread his abstract, and that it was on this account that I failed to understand its contents.

My difficulty was not in understanding the contents, but in understanding how they explained the facts, or why this picturesque conception of a sorting out of the fast and slow molecules without the aid of Maxwell demons, was in any way deemed necessary to the explanation of the heating and cooling of the gas.

Neither Natanson's elaborate quantitative treatment nor what Mr. Fireman calls his simple qualitative explanation appears to be necessary to account for the heating and cooling in the two receivers, in spite of Mr. Fireman's assertion that the explanation commonly given is unsatisfactory.

Mr. Fireman appears to have overlooked the fact that, when a compressed gas passes from a receiver into an exhausted chamber, there is, in addition to the molecular motion, a motion of the gas as a whole, *i. e.*, a mass of the gas is given a motion of translation, which is superimposed on the molecular motion.

To originate this motion requires an expenditure of energy, and a consequent lowering of temperature results. The matter is fully treated in the works of Clausius, Maxwell, Kelvin and Meyer, where it is shown that when a mass of gas is set in motion by its own expansion, the mean molecular velocity becomes less and the temperature is lowered; since the mean velocity is less, the component of molecular perpendicular to the direction of flow is less, and consequently the pressure in this direction is less than in the case of the gas at rest. This accounts for the cooling in the compression chamber.

The heating of the gas in the second receiver is to be referred to the same causes as the heating of the gas under the piston in the case of compression.

Mr. Fireman has difficulty in understanding how a higher average molecular velocity,

and consequent higher temperature, can be given to the gas which has passed into the second receiver by the portions which subsequently enter it. This is due to the fact that he ignores the motion of translation which the entering gas possesses. A mass of gas in motion as a whole, will act on another mass of gas in the same way as a moving piston, namely, increase the velocity of the molecules which collide with it.

Detailed criticism of Mr. Fireman's paper will have to be suspended until its publication. The statements in the abstract are very vague, and the author certainly does not show how the molecules with slow velocities force their way back against the rushing stream, and congregate in the first receiver.

We sometimes find the statement in textbooks that a gas expanding under such conditions that no work is done experiences no cooling, for example, when expanding into an infinite vacuum. It appears questionable, however, whether a gas can expand without doing work. Leaving out of consideration the internal work, *i. e.*, the overcoming of the forces of cohesion, we still have the gas in the receiver doing work in giving a motion of translation to the mass of gas thrown out into the vacuum.

R. W. WOOD.

JOHNS HOPKINS UNIVERSITY.

BITTER ROT OF APPLES.

IN the article upon this subject in *SCIENCE* for October 24, 1902, page 669, there is no reference to similar investigations with like results previously published. There is, however, an intimation that earlier knowledge was insufficient to justify publication.

There is sent herewith a 'circular' and a 'bulletin' issued by the Agricultural Experiment Station of the University of Illinois, which were put into the mails on respectively the fourteenth and twenty-ninth days of July of this year. Of the first there were sent out 1,200, and of the second 20,000 copies. They have each been referred to or copied entire in at least one hundred different periodicals throughout the country. Copies were mailed direct on the days indicated to the author whose name is signed first to the article now in

question, and he may easily have first learned by this means of Mr. Simpson's discovery. At all events the publication of July 14 was in the possession of the general public before these special studies were begun in Illinois by the authors of this later paper.

Field studies made on July 11, 12 and 13 in orchards near Parkersburg, Olney, Clay City, Salem and Tonti, Illinois, by Professor J. C. Blair and myself, left no room for doubt that the early infection of the fruit was mainly from the limb cankers. These cankers were found, after we learned how to look for them, as sources of such infection in hundreds of instances with not five per cent. of failures. Then two hours with the compound microscope on the evening of July 12, at our laboratory at Salem, demonstrated beyond cavil the protrusion of the spores of this specific *Gleosporium* from the cankers. Such spores positively so produced were at this time inoculated into fresh apples, and the resultant spots, which showed on the 14th, were clearly identified as those of bitter rot on the 15th—three days after the inoculations—while check punctures remained sterile. These tests were often repeated during following days, with the same results.

This disease of the apple has annually caused serious losses, amounting to over \$1,500,000 in the same region of Illinois two years ago. Here was evidently a new and presumably an efficient method of combating the scourge if prompt action should be taken. Surely delay in making the facts known would have been reprehensible. As a matter of pure science the subject was sufficiently ripe for publication on the 29th of July as the bulletin fairly shows.

T. J. BURRILL.

UNIVERSITY OF ILLINOIS.

A PECULIAR HAILSTORM.

DURING the past summer, while on a reconnaissance survey in southern Keewatin, for the Geological Survey of Canada, the writer's party encountered an unusual number of electric storms, particularly during the months of June and July. Quite frequently these storms were accompanied by heavy rain and hail. The heaviest of these commenced about

7:10 on the evening of July 12 and lasted about twenty minutes. As the size of the hailstones was very much larger than is usual in this part of Canada, and as the storm was accompanied by an unusual phenomenon, noted below, it seems worthy of record.

The storm approached us from the southeast, while we were near the divide between streams flowing southwest to the English River and Lake Winnipeg, and those flowing easterly towards the Cat River, a large stream, or rather a chain of lakes tributary to the Albany River. The hailstones varied from about the size of buckshot or small marbles to spheres and other forms over one inch in diameter. One large stone, in shape a compressed ovoid, measured $1.25 \times 1.75 \times 2.25$ inches. Others over 1.50 inches in diameter were plentiful. The smaller hailstones were almost invariably of clear ice with a small white nucleus of snow. The larger ones were usually white with a transparent nucleus. Many of the pellets, both small and large, were almost perfect spheres, but not infrequently the large ones took the form of disks, thin and transparent in the middle, with thicker edges of snow, reminding one of the shape of the red blood corpuscles or the fly-wheel of a sewing machine. One large pellet of this kind measured 1.75 inches in diameter and the circular rim was one inch thick, the middle portion of the disk being transparent. The disks were more often ellipsoidal than circular. The surface was generally warty or mammillated, as if produced by the coalescence of a number of independent hailstones, whereas that of the spheres and ovoids was usually smooth.

The most interesting feature accompanying the storm was the behavior of the moss carpet flooring the spruce forest everywhere. In this portion of the district this surface cover consists almost wholly of a dense mat of the moss *Hypnum triquetrum*, through which are woven a tangled mass of roots, living and dead. The thickness of the cover varies from a few inches to over a foot. During the storm there was no wind noticeable in or near the camp. The moss carpet in front of and underneath our tent was seen and felt to be heaved in

waves, the crest lines, just in front of the tent door, sometimes raising the moss as much as a foot above the normal position. These undulations traveled in the same direction as the storm was moving, *i. e.*, towards the northwest. No two crests were seen to be in existence at the same time, but the field of view was limited to an area of about thirty feet across in the direction the waves were moving. The movement began, or at least was first noticed, near the end of the hailstorm, and continued for some time after the rain and hail had ceased to fall, lasting for a period between five and ten minutes. The writer has frequently been in the moss-carpeted spruce forests of central Canada during thunder storms, but has not happened heretofore to have met a similar phenomenon. The cause of the movement seems to lie in the fact that the moss cover retained the water which first fell upon it, soaking it up like a sponge and hence became nearly air-proof. The air underneath, in the interspaces between the boulders and fallen timber upon which the moss lies, would sympathetically respond to slight variations in the barometric pressure and cause the moss to rise and fall as the pressure decreased or increased. Soon after the movement ceased many of the spaces that before contained only air were filled with water, and walking on the moss was not unlike walking on a wet sponge.

ALFRED W. G. WILSON.

McGILL UNIVERSITY, MONTREAL.

WHAT IS NATURE STUDY?

As was stated in SCIENCE for June 20, of this year, there seem to be, among educators, many conflicting definitions in the attempt to answer the above question. Bearing on this subject the following letters have been received from eminent scientific men of this country. They appear in the order in which they were received.

W. J. BEAL.

AGRICULTURAL COLLEGE, MICH.

The present movement toward developing and spreading an interest in nature studies is one of prime importance. Our American children are, after all the efforts thus far made, woefully lacking in interest in natural

history—far behind German, and even English children, I fancy.

I consider 'nature study' as a study of plant and animal life at first hand, rather than from books; seeing, examining and studying a plant or animal, how it grows; if an animal, how it moves, runs, walks, flies, swims, how it gets its livelihood; and then the child can learn to observe its relation to the life about it and to the world around. Let him observe, for example, ants, the difference between the males, females and workers, how the workers live and care for the colony. He may see a train of ants; let him follow the train off to the nest. Then there are the nests and working habits of wasps and bees.

A student of 'nature study'—a boy or girl—should raise caterpillars to the chrysalis and moth or butterfly state. Collecting, feeding them, watching them through their transformations, is a first class lesson for a child in nature study. So a boy or girl can get a first lesson in physical geography and geology by studying a sand heap or clay bank after a rain—or the work done by a stream or brook.

Nature study is the first step towards natural science, and is all-important in leading one to observe, experiment and reason from the facts he sees. It is of prime importance in teaching a child *what a fact is* in these days of Christian Science and other fads.

A. S. PACKARD.

BROWN UNIVERSITY.

I do not believe I can give in a few sentences my views as to what constitutes nature study. I think the thing is in a chaotic state at present, and I do not feel competent to define it. I have fairly definite ideas as to what material in botany should be included, but botany is only one of the phases of the subject as handled. I think the name nature study is too indefinite to be retained.

JOHN M. COULTER.

UNIVERSITY OF CHICAGO.

I have your letter asking for my definition of 'nature study.' I hope you will succeed in getting this much-abused term properly defined.

I would have nature study mean the study of living things to determine their habits, instincts, adaptations and relations to environments. To be nature study in the highest sense of the term, the work must be carried on under natural, as opposed to artificial, conditions.

If a broader interpretation were given, where can we stop short of geology, mineralogy, chemistry, physics, and in fact nearly everything else outside of mathematics.

C. P. GILLETTE.

FORT COLLINS, COLO.

Much that has been taught under the name of nature study is not properly a study of nature, but a *memoriter* drill or an empirical abstract of what some one else has learned by a study of nature. The subject has too often been presented under the guidance of teachers who themselves have made no real study of nature—who have no clear understanding of the scientific method of study by which alone matters of natural fact can be approached, and who have not sufficient competence to carry on the study of nature by themselves. But nature study is sometimes what it ought to be: a truly scientific and well-conducted study of nature, of a grade, whether elementary or advanced, appropriate to the age of the pupils; as logical as geometry and as disciplinary as Latin, but entirely unlike either one of these standard subjects.

Direct observational appeal to natural phenomena should always be the essential foundation of a real knowledge of nature, and much skill should be exercised by the teacher in selecting from nature's inexhaustible store such phenomena for study as shall really be within reach of the pupils' own observation and understanding. The text-books should serve chiefly to broaden the knowledge gained through observation by presenting additional examples of similar phenomena from various parts of the world. At the same time, and always in a measure appropriate to the grade of the class, the various other processes of scientific method should be brought into play: generalization, invention of explanations, test of explanations by deduction, appeal to experi-

ment, the need of a critical and unprejudiced judgment in reaching conclusions, revision of work and suspension of judgment in doubtful cases. Elementary examples of all these processes may be presented, though those just named are more appropriate than the others for young classes.

In the illustration of nature study with excerpts from poems, I have comparatively little interest, especially when, as is so often the case, the excerpts are not chosen by the teacher, and still less when the teacher's temperament is not poetic. Spontaneous quotations from any field of really good literature in prose or poetry, brought in because of real literary feeling on the teacher's part, are in just measure admirable aids to study of all kinds; but if poems on nature be made an essential part of nature study, it is likely to become emotional rather than scientific and disciplinary.

Desire and capacity to carry the study of nature further should be the chief end of nature study, and it is for this reason that I would emphasize in all grades the disciplinary rather than the sentimental view of the subject. The scientific method should be constantly inculcated, but more by example than by precept.

This should lead to a clear understanding of the order of nature, based not on authority but on the cultivation and use of a keen, unprejudiced, sympathetic reason: emotional sentiment, a subject responsive in so far as it is excited by natural phenomena, is better cultivated in the appreciative study of art and literature than in nature study.

W. M. DAVIS.

CAMBRIDGE, MASS.

Properly it is simply synonymous with the good old term 'natural history.'

As I take it, all zoologists, botanists, biologists, etc., are pursuing 'nature study,' each in his own way. I have no sympathy with the desire of some superficial persons to limit such a term to kindergarten work in zoology and botany, which is about the idea held in some schools.

That kind of work is right and proper and useful in its place, but why it should monopo-

lize the term 'nature study' is known only to the minds of those who can go no farther than the a b c of science.

E. A. VERRILL.

NEW HAVEN, CONN.

I should say that, on the positive side, any direct contact with natural objects, continued by critical or comparative studies, either elementary or advanced, should come under the head of nature study. Negatively, I should exclude all fairy stories about animals and plants, all fantastic stories of creatures more or less imaginary, and should restrict the term so as to include only such work as would bring the student face to face with realities. The essential virtue of nature study lies in its reality, as distinguished from the conventional, artificial or second-hand kinds of learning.

DAVID STARR JORDAN.

STANFORD UNIVERSITY, CALIF.

I should say that by nature study a good teacher means such study of the natural world as leads to sympathy with it. The keynote, in my opinion, for all nature study is sympathy. Such study in the schools is not botany; it is not zoology; although, of course, not contravening either. But by nature study we mean such a presentation, to young people, of the outside world that our children learn to love all nature's forms and cease to abuse them. The study of natural science leads, to be sure, to these results, but its methods are long and have a different primary object.

THOMAS H. MACBRIDE.

UNIVERSITY OF IOWA.

Besides the letters above, a brief quotation is here given from an excellent book recently published by Clifton F. Hodge, Ph.D., of Clark University:

Nature study is learning those things in nature that are best worth knowing, to the end of doing those things that make life most worth the living.

My point is that nature study, or elementary science, for the public school ought to be all for *sure human good*.

Here is a paragraph from a recent letter

from Mrs. J. M. Arms, who is in charge of nature study in the schools of Boston, Mass.:

Nature study is simply the study of nature, not the study of books. It is a course of nature lessons especially adapted for elementary schools. Minerals, rocks, plants and animals are the necessary materials for such lessons. The method of study may be expressed in three words, observation, comparison, inference. The child must be made to see the object he looks at, and to this end he tries to draw it and to describe it in writing. Comparative work is mental training, which, combined with the observational training already spoken of, gives a certain degree of mental power. This power gained in the early years increases with continued effort. Fortunately, this work is recognized as one of the potent agencies in producing efficient men and women equipped for a life work that shall make for the betterment and enlightenment of humanity.

SHORTER ARTICLES.

DISCOVERY OF TEETH IN BAPTANODON, AN ICHTHYOSAURIAN FROM THE JURASSIC OF WYOMING.

AMONG the vertebrate fossils collected by Mr. O. A. Peterson during the season of 1900 on Sheep Creek, Albany County, Wyo., there was obtained from the lower beds of the Jurassic a very complete skull of an Ichthyosaurian reptile (*Baptanodon discus*?) together with a few vertebrae and ribs.

Through the courtesy of Mr. J. B. Hatcher, curator of the Department of Vertebrate Paleontology of the Carnegie Museum, this material has been placed at the disposal of the writer for study and description.

Heretofore the American Jurassic Ichthyosaurians were supposed to be edentulous, but while preparing this specimen (No. 603) for study the remarkable discovery was made that the jaws bore teeth, two of which were found between the jaws near the end of the snout. One tooth was apparently in position in the upper jaw, while the other lay imbedded in the matrix between the jaws and entirely detached from them. The teeth are small, conical, and covered with longitudinal striae.

In general form and surface markings they resemble very closely the teeth of the Liassic Ichthyosaurs of England and Europe. The teeth were undoubtedly loosely fixed in the jaws and have been lost in all previously discovered specimens. In the present skull a few of them have fortunately been retained, and we have here the first evidence of their presence in *Baptanodon*, which may be regarded as the American representative of the Ichthyosaurian reptiles.

When the skull is entirely freed from the matrix and the jaws separated from one another, more teeth will doubtless be exposed.

From the above evidence it would appear that the generic terms *Baptanodon* (*Sauranodon*) of Marsh* are misnomers.

The reduction in size and number of the teeth in the Jurassic Ichthyosaurians is paralleled in some of the recent Cetacea. Most if not all of the early (Eocene and Miocene) cetaceans were well provided with functional teeth, while in many modern forms these either have been entirely lost or have become rudimentary, in some instances appearing only in the embryonic or young stage of the individual. Just so the early Ichthyosaurs were provided with an abundance of teeth, but in later forms the number and size of the teeth were reduced, until in *Baptanodon* a form was developed which, while still possessing teeth, was practically edentulous.

Ichthyosaurus longirostris as described by Owen,† was in this respect intermediate between *Ichthyosaurus longifrons* from the Lias of England and Europe, and *Baptanodon discus* of the American Jurassic.

The presence of teeth, though undoubtedly reduced in number and in size in American Ichthyosaurians, may perhaps be considered as invalidating the genus *Baptanodon*, for on that character alone Marsh distinguished that genus from the European genus *Ichthyosaurus*. It would seem better, however, to retain the generic name *Baptanodon* until

* 'A New Order of Extinct Reptiles, Sauranodonta,' *Amer. Journ. of Science and Arts*, Vol. XVI., January, 1879, p. 85.

† 'Fossil Reptilia of the Liassic Formation,' part third, p. 124.

it has been conclusively shown to be generically identical with *Ophthalmosaurus* or *Ichthyosaurus*. On the other hand, some may contend that the present specimen is distinguishable generically from *Baptanodon*, although the writer at present does not believe this.

Should further studies or future discoveries demonstrate the present specimen to pertain to a distinct genus and species, it might then be very appropriately called *Microdontosaurus petersonii*, and should those forms previously described by Marsh still prove to be edentulous this character would alone be sufficient to distinguish it generically from *Baptanodon*. To definitely distinguish it, however, from *Ophthalmosaurus* is at present not possible, and the American and European forms may yet prove to be generically identical.

This discovery is of further importance from a geological standpoint. The existence of forms so similar in beds which in America have been referred by Marsh and others to the lower Jurassic and in England and Europe to the Liassic is of the greatest value for purposes of correlation, and if it does not demonstrate the equivalent age of these two deposits it at least furnishes additional evidence in favor of the Jurassic age of the conformably and immediately overlying *Atlantosaurus* beds of Marsh, as was consistently maintained by that author.

The points it is desired to emphasize in this preliminary paper are:

1. *The presence of Ichthyosaurians with teeth in the American Jurassic.*
2. *The great similarity and perhaps generic identity of Baptanodon and Ophthalmosaurus.*
3. *The further evidence it affords in favor of the Jurassic age of the Atlantosaurus beds of Marsh, which has been seriously questioned by some authorities.*

This material will be more fully described and illustrated in a paper now in preparation by the present author.

CHARLES W. GILMORE.

CARNEGIE MUSEUM,
November 12, 1902.

CURRENT NOTES ON PHYSIOGRAPHY.

RIVERS OF SOUTH DAKOTA.

THE 'Hydrographic History of South Dakota,' by J. E. Todd (*Bull. Geol. Soc. Amer.*, XIII., 1902, pp. 27-40, maps) summarizes the work of some ten years in serviceable form. The general eastward slope from the Rocky mountains and Black hills (whether resulting from the tilting of formerly level lacustrine strata, or from the slant of fluvial deposition) determined the delivery of six east-flowing streams to a preglacial geosynclinal south-flowing trunk river whose course is roughly represented by James river in eastern Dakota and by the existing Missouri further south. The broad James valley was invaded by a great ice lobe, 1,000 to 2,000 feet thick, in the latest (Wisconsin) epoch of the glacial period; the east-flowing streams were thereby obstructed, with the result of producing temporary lakes whose combined southward outlets across the preglacial interfluvies determined the Missouri river in Dakota. Evidence of the changes thus involved is found in the abundant moraines on the present divide between Missouri and James, in the masked extension under these moraines of the preglacial east-sloping valleys and their interfluvies, in the shore lines of various temporary lakes, and in the apparently younger form of the Missouri valley where it cuts through the interfluvies, although but few details are given on the latter point. The associated changes in several other rivers are traced.

ARGENTINE-CHILEAN BOUNDARY.

A REMARKABLE report by the Argentine commissioners on the Argentine-Chilean boundary has been presented to the British arbitration tribunal. It consists of five quarto volumes, printed for the Argentine government by Clowes (London, 1900), with numerous photographic plates and maps, from which a great amount of geographic and physiographic information may be obtained. The dispute that the arbitration tribunal is to settle turns, as is not infrequently the case in such disputes, upon an insufficiency of physiographic detail in the description of

the international boundary in the treaty by which it was defined. "The frontier line shall run * * * along the most elevated crests of said Cordilleras that may divide the waters, and shall pass between the slopes which descend one side and the other." The Argentines, therefore, claim that the line should follow the crest of the Andes, crossing where necessary the courses of those rivers which flow through the range; while the Chileans claim that it should follow the water parting, even when that would lead the line far out upon the open pampas many miles east of the mountains. The fact that mountain ranges are sometimes cut through by the deep gorges of through-going, transverse rivers was well known as a general physiographic occurrence at the time when the boundary treaty was drawn up (1881), though the numerous specific instances of this kind in the mountain range in question had then been hardly recognized. In spite of this want of local information, it does not seem unreasonable to blame the diplomats who drew up the boundary treaty for being so careless with respect to complications of known possibility. They might have learned a profitable lesson from the practice of patent lawyers, who make so thorough a defense of a new invention. The only disturbing complications mentioned in the treaty were those arising in valleys formed by 'bifurcation of the Cordillera' where 'the watershed may not be apparent.'

The maps, plates and text of the 'Report' give many details concerning the crest line of the Andes, the deep gorges by which the mountains are cut through, and the topography, frequently morainic, of the pampas around the headwaters of the through-flowing rivers. These features have been described in abstract in certain of the European geographical journals, where at least one writer explains the transverse gorges by the capture of eastern drainage areas by the normal retrogressive erosion of streams on the western mountain slope. It is difficult to accept this explanation, because it is not shown that the western streams have enjoyed any advantage, such as should have led them to acquire so much drainage from their eastern competitors at so

early a stage of mountain dissection as that now reached by the Andes. Hatcher has suggested, on the basis of his own observations, that the peculiar river courses result from relatively recent deformation of the region. The aid that glacial erosion may have given does not seem to have been considered, although the possible sawing down of divides by overflowing glaciers has elsewhere been shown to be an important process in heavily glaciated regions.

MAPS OF FAROE ISLANDS.

THE Danish General Staff has published fifty-three sheets of an elaborate topographical map of what we tautologically call the Faroe Islands. The map is printed in four colors on a scale of 1:20,000, with contours every ten (sometimes every five) meters. Only the skeleton of what was originally a lava plateau now remains. The larger islands are divided into separate uplands by broadly open, trough-shaped, through-going valleys that descend with gentle slope in both directions from a low valley-floor divide. The sounds by which the islands are separated seem to be only submerged valleys of the same kind. Great cirques, from half a mile to a mile across, open from the main valleys. The strong slopes of the valleys and cirques are notably smooth, unravined by the numerous streams that descend from the uplands; and hence it may be concluded that much of the dissection of the lava plateau has been accomplished by ice action. If so, it is here, as elsewhere, unsafe to infer postglacial submergence simply because some of the valleys are drowned; for if glaciers can erode at all they can certainly erode to a significant depth beneath sea level. The sea-cut cliffs are very bold on the western coast; those of Strömö are 500 or 600 meters high at a distance of only 200 or 300 meters inland from the shore line.

W. M. DAVIS.

THE MAGNETIC SURVEY OF LOUISIANA.

ARRANGEMENTS have just been completed between Superintendent Tittmann and the State Geologist, Professor G. D. Harris, for making a detailed magnetic survey of Louisiana under

the joint auspices of the State Geological Survey and the Coast and Geodetic Survey. Professor Harris is arranging to have the field work begin soon after the Christmas holidays. It will be the endeavor to complete the greater part of the work by June 1, 1903. Mr. Edwin Smith will represent the Coast and Geodetic Survey on this important work. Louisiana is the third state within recent years to avail itself of the unrivaled facilities and instrumental equipment of the Coast and Geodetic Survey for rapid and successful magnetic work.

Dr. L. A. Bauer, during his recent inspection tour of two months covering the region from the north shore of Lake Superior to the southern part of Texas, besides visiting the various magnetic parties working in that region, determined the dip at a number of stations with two totally different instruments, the one a French dip circle and the other a Lloyd-Creak dip circle primarily intended for observations at sea. With the latter dip circle he likewise determined the total magnetic intensity, and multiplying the value thus obtained by the cosine of the dip the horizontal intensity was obtained. Next the horizontal intensity was observed directly with a French magnetometer. With the same instruments comparisons were made with the instruments of each party visited. Thus an interesting series of observations has resulted serving to test the constancy of dip circle standardizations for the entire range of dip embraced in the United States, and giving the means of determining the relative accuracy of field intensity determinations by two totally different methods and with two greatly differing instruments.

The Coast and Geodetic Survey is preparing to make magnetic observations (declination, dip and intensity) on board the *Blake*, an entirely wooden vessel, which is to sail for Porto Rico soon after January 1. The necessary instruments have been secured and are now being installed in the ship. The dip circle—a greatly improved form of the Fox dip circle, known as the Lloyd-Creak dip circle, with which the dip and total intensity observations will be made, is similar to the

instruments supplied to the English Antarctic ship, the *Discovery*, and to the German Antarctic ship, the *Gauss*.

THE RHODES SCHOLARSHIPS.*

ARRANGEMENTS are being made for the Rhodes scholars to take up their residence in Oxford at the earliest possible date. Mr. G. R. Parkin, LL.D., Principal of Upper Canada College, Toronto, the organizing agent for the trustees of the Rhodes scholarships, is on a visit to Oxford on behalf of the various countries interested, and, after consultation with the university and college authorities, will frame for the approval of the trustees a scheme for the election of the scholars. As the bequest of Mr. Rhodes suggests that the scholars shall come into residence at the various colleges and shall pursue a three year's course, it is all important that a clear understanding of the attitude of the university and of the individual colleges towards the scholars thus to be elected should be ascertained as a necessary preliminary to Mr. Parkin's work abroad. This is the object of his visit to Oxford. Acting on the advice of the vice-chancellor and a committee of the Hebdomadal Council, Mr. Parkin addressed a series of questions to various heads of colleges in order that the matter might be formally brought under the consideration of the respective societies. The questions were as under:

1. Is your college willing to receive each year's number of the Rhodes scholars, and, if so, how many?
2. What are the conditions of entrance upon which your college would insist? Would they necessarily include any examination of your own?
3. Would you be able to give any Rhodes scholars accepted by you rooms in the college buildings from the time of their entrance and for how long?
4. At what date in each year would you require notification of the election of scholars in order that rooms may be assigned them and arrangements made for their entrance.
5. Would you wish scholars accepted by you to come under ordinary undergraduate conditions as to age and attainments, or would you prefer men prepared to take advanced or post-graduate work?

* From the *London Times*.

6. Have you any suggestions to make from your college point of view likely to be helpful to the trustees in their endeavor to make the bequest of Mr. Rhodes most effective?

The answers to the questions will be submitted to the trustees for their consideration. The first year the bequest comes into operation there will be elected probably between 70 and 75 scholars, the same number for the second year, and for the third year about 30, the numbers continuing thereafter from year to year in about the same proportion. The bulk of the replies to the questions have yet to be received, as the queries have not at present been formally submitted to the college meetings, but the reception which Mr. Parkin has met with at the hands of the heads of colleges has been most gratifying.

In the course of a statement made yesterday Mr. Parkin said: "What has impressed me greatly since I have been in Oxford is the exceedingly hearty and interested way in which all the colleges have discussed the best plan of working the Rhodes scholars into the university system. A universal feeling prevails that the conception of Rhodes was a splendid one, has in it more possibilities in the future, and is likely to make a profound impression on the English-speaking world. It is also very generally felt, I think, that any failure to make a complete success of this great thought of Mr. Rhodes would be a check to all giving on a grand scale for a long time to come. The heads of colleges and fellows I have found everywhere ready to cooperate with the Rhodes trustees in making this bequest most effective. We are only gradually getting answers to the questions which have been propounded to the various colleges, but all the replies that have come in are highly favorable. According to their size, each of the colleges seems prepared to take from two to five of the Rhodes scholars every year. This would give to the smaller colleges six in all for the three years' scholarship, and to the larger colleges about fifteen, when the plan is in full operation. As the holders of these scholarships will be very carefully selected from each of the colonies and from each state of the American Union, I have every reason to think that a high average of

man will be obtained—almost certainly a serious, earnest man, but interested in college athletics and all the best sides of college life, in accordance with the ideas that Mr. Rhodes had about the selection of such candidates. The interest taken in the matter in all parts of the world is illustrated by the flood of correspondence which has been poured in upon me as representing the trustees, upon the vice-chancellor and everybody who could be supposed to have any connection with the scheme."

SCIENTIFIC NOTES AND NEWS.

PRESIDENT ROOSEVELT has consented to act as honorary president of the local committee for the Washington meeting of the American Association for the Advancement of Science.

THE trustees of the Carnegie Institution held their first annual meeting in Washington on November 25. The positive action taken consisted in the appropriation of \$200,000 for grants for research, \$40,000 for publication, \$50,000 for administrative expenses, and \$100,000 to be placed in a reserve fund. All specific requests for aid were referred back to the executive committee for action. The Year Book, now in course of preparation, will contain the reports of the various committees and other material that will be of general interest.

EMPEROR WILLIAM in the farewell audience of Ambassador White presented him with the Gold Medal of the empire for science and art, which is given once a year to a person, either a German or a foreigner, who, in the opinion of the government, is best entitled to it.

LORD REAY, chairman of the London school board since 1897, and president of the Royal Asiatic Society and of University College, London, has been elected first president of the British Academy.

MR. FRANCIS GALTON has been elected an honorary fellow of Trinity College, Cambridge.

DR. M. TREUB, director of the Royal Botanic Gardens at Buitenzorg, Java, is at present in the United States.

DR. JUAN GUITÉRAS and Dr. Carlos Finley will represent Cuba at the sanitary congress to be held in Washington in December.

PROFESSOR WILLIAM LIBBEY has returned to Princeton from a year's trip devoted to exploration in Egypt and Palestine.

DR. FREDERIC E. CLEMENTS, of the botanical department of the University of Nebraska, has been granted a month's leave of absence in order that he may study at the New York Botanical Garden. He will return to Nebraska after the Washington meetings.

P. J. O'GARA, assistant in botany in the University of Nebraska, has been appointed student aid in pathology, in the Division of Plant Physiology and Pathology in the Department of Agriculture.

DR. F. A. WILDER has recently been appointed state geologist of North Dakota and professor of geology in the State University. Dr. Wilder comes to North Dakota with a varied experience in geological work and with an excellent record in connection with other surveys, notably that of Iowa. There is a growing demand for geological work, especially in our northwestern states, and North Dakota is fortunate in securing a man so well qualified for the work of the State Geological Survey. The work of the survey is an adjunct to the department of geology in the State University, located at Grand Forks.

CAPTAIN ROBERT E. PEARY gave an address before the National Geographic Society at Washington on November 29.

THE American Institute of Electrical Engineers has appointed a committee consisting of Ralph D. Merzhon, chairman, and Messrs. F. O. Blackwell, C. C. Chesney, P. M. Lincoln and R. S. Masson, for the purpose of collecting data respecting present practice in electric transmission at high voltage and of presenting a report which will indicate the successful methods which are now in operation in such form as to be of immediate value to electrical engineers.

As we have already stated, a committee with Professor Waldeyer as chairman is collecting funds for erecting a monument to Rudolf Virchow in Berlin. American subscriptions may be sent to Drs. Frank Billings, president of the American Medical Association, 100 State St., Chicago, Ill.; Thomas D.

Coleman, 505 Green St., Augusta, Ga.; A. Jacobi, 19 East Forty-seventh St., New York City; W. W. Keen, president of the Congress of American Physicians and Surgeons, 1729 Chestnut St., Philadelphia, Pa.; or Wm. H. Welch, 935 St. Paul St., Baltimore, Md.

JOSEPH MILLER WILSON, a well-known civil engineer of Philadelphia, died on November 24 at the age of sixty-four years. He had been engineer of the Pennsylvania railroad, and had carried out numerous works of importance. He was a member of the principal engineering societies and a fellow of the American Association for the Advancement of Science.

SIR WILLIAM CHANDLER ROBERTS-AUSTEN, professor of metallurgy in the Royal School of Mines, London, since 1880, and honorary general secretary of the British Association for the Advancement of Science, died on November 23, at the age of fifty-nine years.

THE *Morning*, which has been fitted out as a relief ship to the *Discovery*, arrived at Lyttelton, N. Z., on November 16.

LAST winter the legislature of New York State appointed a commission consisting of C. P. Steinmetz, H. W. Buck and State Engineer Edward A. Bond, to investigate and report upon the advisability of the state establishing an electrical laboratory. We learn from the *Electrical World* that the commission has held several meetings, and on November 13, it held a meeting at Niagara Falls, the three commissioners being in attendance. It is intimated that the commission will report in favor of establishing the institution referred to, which will also serve as a standardization bureau. Among other things it is reported that the commission has learned that the amount of capital in New York State directly interested in the development and use of electricity is \$1,680,590,290, made up of \$217,974,695 representing the capitalization of the companies engaged in the manufacture of electrical apparatus, and \$1,462,615,595, the capitalization of the companies involving the use of electricity.

AT a meeting of the Michigan Section of the American Chemical Society, held in the

chemical laboratory of the University of Michigan, November 7, the following papers were read: 'A Rapid and Accurate Method for the Determination of Sulphur in Coal,' by Mr. C. Sundstrom; 'Non-uniformity in Portland Cements'; 'Causes and Remedies,' by Mr. O. Button, of the Hecla Portland Cement Company.

THE 228th meeting of the New York Electrical Society was held in the lecture room of the American Institute on November 25, when Mr. A. Frederick Collins lectured on 'Operative Systems of Wireless Telegraphy.'

THE American Electrochemical Society will hold the annual meeting of the society in New York on Thursday, Friday and Saturday of the week following Easter Sunday. A committee was appointed to arrange with the American Institute of Electrical Engineers for a contemporary meeting to be held in September at Sault Ste. Marie.

AN International Exposition of Hygiene will be held at Buenos Ayres in connection with the second Latin-American Medical Congress, which will hold its sessions in April, 1904. An invitation is extended to public and private institutions interested in the subject to participate in the exposition. Reduced rates for the transportation of exhibits have already been obtained from several steamship companies.

A SUMMARY of the progress of the Geological Survey of the United Kingdom and Museum of Practical Geology for 1901 has been issued by the Board of Agriculture. According to the abstract in the *London Times* it gives a full account of the field work of the Geological Survey throughout the year and of the chemical, petrological and paleontological work in connection therewith. In the west of England the process of subdividing the great killas-formation of De la Becha has been continued, and a new division—the Hayle sandstone—has been recognized. A considerable mass of granite, later in date than the main mass, has been found in the Land's End district, thus proving that the granitic area is not so simple in structure as is represented in the earlier maps. Special attention has been paid to the metamorphism produced by

the granite, not only on account of its scientific interest, but also because the more important mineral veins occur in the metamorphic zone. In the Devonian and Carboniferous areas of the west of England additional evidence has been obtained of an important unconformity between the middle culm or wearde beds and the Devonian. In the South Wales area the detailed examination of the coalfield has proceeded as far west as Swansea, and some new inliers of Silurian rocks have been detected in Gower. The resurvey of the Midland coalfields has been continued. In the northern district of Scotland work has been carried on in Ross-shire and Inverness-shire, extending eastwards from Loch Hourn and Loch Ailsh. Much additional information has been obtained as to the crystalline schists and the associated igneous rocks. Cretaceous rocks have for the first time been noticed in Soay Sound and Scalpay in the Skye district, and an interesting series of composite dykes of Tertiary age has been found in the Lorne plateau. The detailed mapping of the drifts in Ireland was begun in the Dublin area. Two points are cited as being worthy of special mention. The esker-like ridge south of the Liffey has been found at one point to rest on a water-worn floor of carboniferous limestone. At the same locality the gravels of the ridge can be seen to pass laterally into gravelly clay, full of scratched stones, resting on a striated rock surface. These facts strongly support the widely accepted view that ridges of this type are the casts of sub-glacial water-channels. Analyses of South Wales coals have been begun, and some notes on weathering of magnesian limestones are published.

THE U. S. Department of Agriculture has received through the Department of State notice that a general exposition of hygienic milk supply will be held at Hamburg from May 2 to May 10, 1903. The exposition will embrace eight sections as follows:

Section A.—For milk production: (1) Exhibit of limited number of milch cows of known race; (2) stable fittings and implements; (3) regimen and hygienic food; (4) technics of milk, tests, and execution of; (5) management of milk in

stable and pastures; (6) personnel of milking and stable (clothing, health, and supervision of the same).

Section B.—Veterinary control of the condition of milch cows and of milk: (1) Legislation; (2) management of contagious outbreaks (with demonstration); (3) diseases of milch cows; (4) special disease; (5) unwholesome food plants and drinking water; (6) secretion through the milk of medicinal stuffs; (7) sanitary management; (8) disinfection of stalls (means and apparatus).

Section C.—Conveyance of milk, land, and waterways, railways; conveyance and distribution in cities; (2) cleansing, spinning, cooling, Pasteurizing, sterilizing, and concentrating (condensing) milk; (3) arrangements for measuring and weighing; (4) cleansing apparatus for flasks; (5) machinery for bottling, pouring, and sealing.

Section D.—Exhibit of management and sale of milk (wholesale and retail trade), with complete furnishings.

Section E.—Milk legislation and administration: (1) Laws, ordinances, decrees, and judgments; (2) police supervision of milk traffic (removal, previous examination, preserving, conveyance); (3) chemical and bacteriological inspection; (a) model laboratory, working; (b) instruments and tools for laboratory.

Section F.—Scientific: (1) Means of instruction with scientific demonstration; (2) scientific instruments and tools for milk laboratories; (3) literature, statistics, and graphic exhibitions.

Section G.—Milk preparations: (1) Condensed and prepared for long keeping for use in the army and navy; (2) milk for infants; (3) for therapeutic purposes; (4) other foods and preparations produced from milk.

Section H.—Machinery and apparatus for the treatment of milk in the household.

UNIVERSITY AND EDUCATIONAL NEWS.

MR. JAMES STILLMAN, of New York City, has given \$100,000 to Harvard University for the endowment of a professorship in comparative anatomy.

At a recent meeting of the Board of Trustees of the Iowa State College of Agriculture and Mechanic Arts, the one fifth mill building tax granted by the general assembly will be devoted to the following purposes: the erection of a central building for administrative and general purposes at a cost of \$225,000; an

agricultural building at a cost of \$200,000; of a fire proof addition to Agricultural Hall 60 x 100 feet; a pavilion for agronomy and animal husbandry, 60 feet in diameter, to cost \$50,000; and a suitable heating plant, to cost \$65,000. The central building is to be commenced next spring. This will contain the departments of botany, domestic science, history, English, mathematics, political economy and administrative offices; the \$225,000 does not include furnishing, heating or lighting. The addition to Agricultural Hall will be completed by August, 1903.

THE National Conference of Jewish Charities has established two scholarships at Columbia University and the University of Chicago to train men and women in sociological work for the administration of Hebrew charities in New York and Chicago. The scholarships are of the annual value of about \$750.

THE new laboratory of physics given to the University of Jena by Dr. Carl Zeiss has been dedicated. The former physical laboratory will be used for technical chemistry with Professor Vongerichten as director.

DR. J. H. HYSLOP, professor of logic and ethics at Columbia University, has resigned, owing to ill health.

DR. GEORGE C. CALDWELL, since 1868 professor of chemistry at Cornell University, has retired, in accordance with the recent regulations of the trustees permitting professors to retire with a pension.

J. E. WALLACE WALLIN, PH.D., who has been assistant at Yale and Clark Universities, has been appointed assistant in philosophy at the University of Michigan.

DR. L. ASCHOFF, of Göttingen, has been called to the chair of pathological anatomy at Marburg, vacant by the removal of Dr. Hugo Ribbert to Göttingen.

DR. H. KOBALD, astronomer in the observatory at Kiel, has been made professor in the university.

Erratum: In the article by Mr. Hatcher, page 831, in the second column, fifth line from bottom, for *with* read *within*.